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ABSTRACT

This guide is intended to alert occupational/technology teachers, teacher educators, school administrators, and industrial education supervisors to the need and importance of a strong and active safety program. Responsibilities are detailed for all individuals involved. Teacher liability is addressed. A section on emergency procedures covers reporting and analysis and provides a guide for first aid treatment of selected injuries that could occur in any industrial arts laboratory. Safety instructions are listed for handicapped students and elementary occupational/technology programs. Safety information follows for use of industrial materials, chemicals and hazardous waste, personal protective equipment, hand tool safety, and general laboratory safety. The next section provides 48 machine safety sheets. Each machine safety sheet provides a list of student safety tips and an evaluation form. Machine safety is divided into three instructional areas: manufacturing and construction, graphic communication, and energy and transportation. Safety sheets are also provided for portable power tool safety for 12 tools. Guidelines follow for safety in special attention areas. Other sections address facility planning and machine guarding. Technical reference material, a self-evaluation checklist, and a selected bibliography conclude the guide. (YLB)

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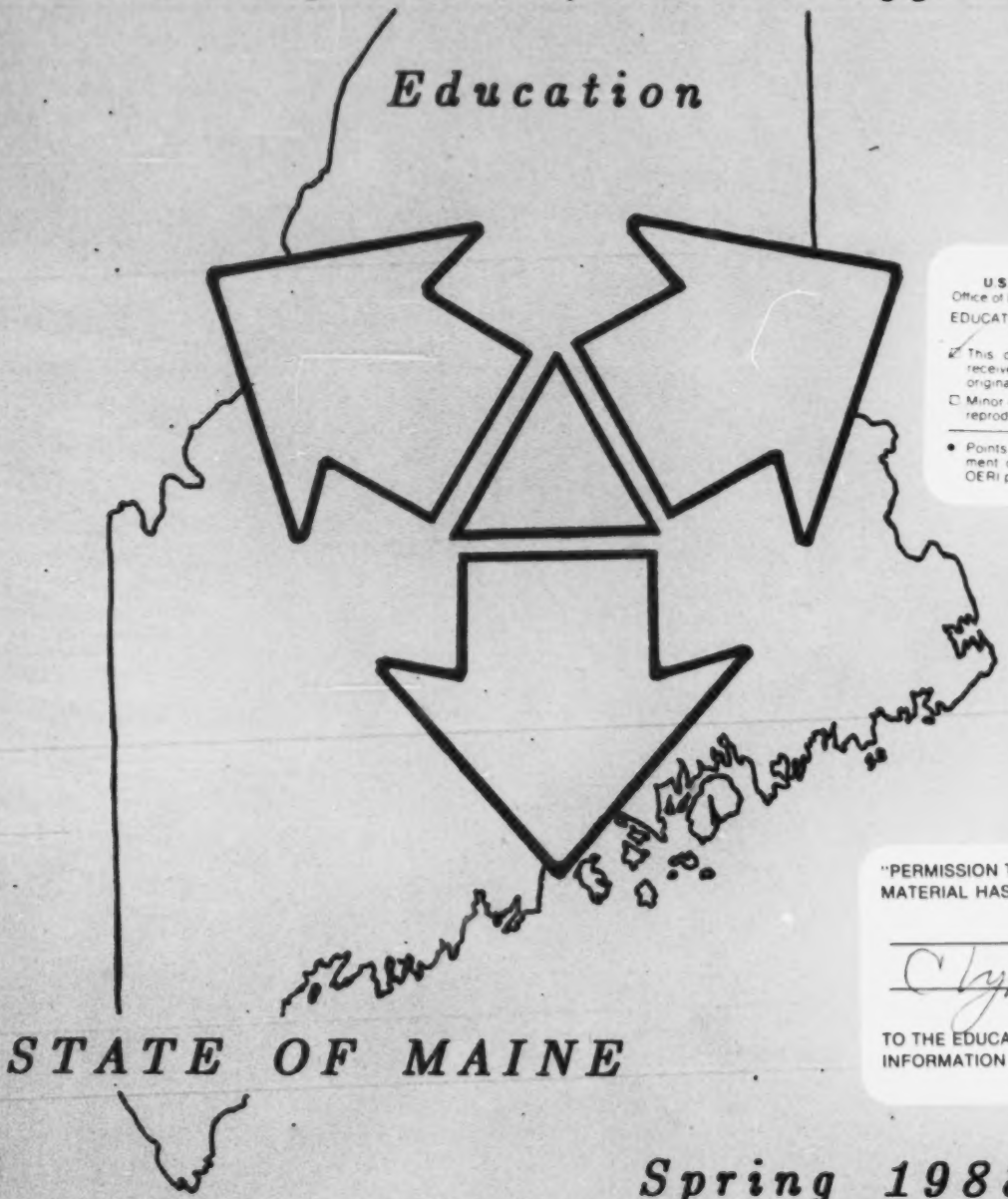
SAFETY & HEALTH

Resource Guide For

Occupational/Technology

Education



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Spring 1988

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SAFETY GUIDE PREPARATION

Spring 1988

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JUSTIFICATION

With any effective safety program one of the major objectives is to instill within those associated with the program a consciousness and positive attitude that will result in safer environments and prevent injury. We certainly are concerned with protecting the students, instructors, supervisors, and administrators against classroom and laboratory liability providing a safe and healthful environment must be one of our major tasks.

An effective safety program centers around several key considerations.

These considerations are:

Provisions for safety instruction on all activities conducted in the Occupational/Technology Education lab or classroom.

Supervision of students at all times in the Occupational/Technology Education laboratory.

Documentation of safety instruction and student attendance at the time of instruction.

Assurance that all aspects of the Occupational/Technology Education facility and its contents are safe for student activities.

Provisions for an on-going maintenance program for all machines and equipment.

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INTRODUCTION

This guide is intended to alert Occupational/Technology teachers, teacher educators, school administrators, Industrial Education supervisors, and all that have a concern to the need and importance of a strong and active safety program. It is also intended to provide the instructional resources for instituting safety instruction in the public schools, for the in-service training of Industrial educators and for the education of undergraduates who are preparing to teach Occupational/Technology and Technical Education in the State of Maine.

Certainly a teacher who takes all possible precaution concerning the safety and well-being of all concerned is in a good position to defend a suit of negligence because of the contribution of the student to an accident.

The following safety related areas might serve as a checklist or starting point for those new to the profession or those of us who have been teaching for awhile:

1. *Proper and thorough safety & health orientation and instruction*
2. *Safety and health tests*
3. *Proper equipment maintenance*
4. *Controlling the environment*
5. *Protective equipment and personal safety*
6. *Record keeping*

STATEMENT BY THE
INDUSTRIAL ARTS/TECHNOLOGY CONSULTANT
Thomas Birmingham

To: The Occupational/Technology Education Community on the Need for Safety and Health

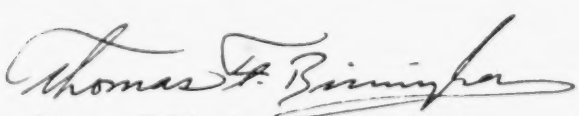
The State of Maine presently has one of the highest worker's compensation insurance rates in the Country. This is due to the state ranking high when compared to other states in terms of lost work time due to a workplace accident and injury. Certainly not an environment that is conducive to industrial growth, attracting new business, or competition in a world economy.

One way to combat workplace injuries is the education of the workforce. This is a very challenging role for technology and occupational education.

Also, the protection of local education agencies against claims of negligence and liability is vital. Much personal and professional anguish can be avoided with appropriate safety and health instruction.

This resource guide will be an indispensable tool in organizing, implementing, and appraising safety and health instruction at all levels of the educational system. This will assist us all in meeting the challenge of creating a more favorable work environment in our state.

I would like to acknowledge Al Kirk's work in the preparation of this guide. He has been patient, diligent, meticulous, and persistent in his efforts. I think the high quality and comprehensive nature of this guide is an achievement that will serve as a pragmatic contribution to the profession for years to come.



Thomas F. Birmingham, Consultant
Industrial Arts/Technology Education

EXPLANATION FOR THE TEACHER

HOW TO USE THE GUIDE

The guide has been placed in a loose-leaf binder to provide flexibility and make it usable for the Occupational/Technology teachers. With the continuous changes and new developments in safety and health education, the loose-leaf binder permits additions and revisions without reprinting the entire guide. All material contained in this guide may be reproduced by the teacher for instruction and for promoting safety and health instruction in the school. The loose-leaf also enables the instructor room for added safety literature, lesson plans, etc.

The material content of this guide falls into the following categories:

- *Resources*
- *Safety information*
- *Instructional suggestions*
- *Materials for student use*
- *Forms and checklists*
- *Lists of responsibilities for safety programming*
- *Facility considerations*
- *Teacher liability*
- *Machine guarding*

It should be pointed out that this is only a guide and is not intended to be complete and all inclusive. Its intention is to draw attention to the necessity for safety and health instruction in every aspect of Occupational/Technology Education and to provide you with the resources for upgrading and improving safety instruction in our programs.

ACKNOWLEDGEMENTS

A special word of thanks is extended to the many individuals who provided input into the writing and revision of this safety guide.

The following groups and organizations contributed:

- *Selected instructor input groups: Industrial Arts and Vocational Education State wide*
- *University of Southern Maine, Dept. of Technology Faculty*
- *Maine Safety Council*
- *Bureau of Oil and Hazardous Material Control*
- *Maine State Bureau of Labor, Division of Safety*
- *Maine Department of Educational and Cultural Services*
- *Industrial Education and Technology Department, Murray State University*
- *Pennsylvania Industrial Arts Association*
- *Federal OSHA - Augusta area office*

Special appreciation is directed to the following individuals who assisted in the effort:

Thomas Birmingham

Arthur Berry

Lester Wood

Paul Lyons

Bill Masters

Mike Hudson

Mike Blotzer

Bill Cassidy

SUGGESTED STATEMENT ON SAFETY

The following is a suggested safety education policy statement:

It is the policy of the _____ school board that an effective occupational safety and health education program be conducted throughout the school system, with its prime objective being accident prevention in the school, at work, and at home. In further support of this policy the school board adopts the provisions of the SAFETY & HEALTH Resource Guide for instruction at all levels.

The superintendent shall be responsible for implementation of this policy and shall make necessary appointments and delegate authority to see that effective safety training and procedures are carried out at all levels within the school district.

RESPONSIBILITY

SCHOOL BOARD AND SUPERINTENDENT

The following functions are considered the responsibility of the school board and superintendent in a comprehensive Vocational/Technology Education program:

1. *A policy statement similar to that shown on page 1.05 should be adopted by the board of school directors.*
2. *Appoint a safety coordinator for the school district and adopt a job description that reflects that responsibility. Suggested job description at the bottom of this page.*
3. *Provide separate funding for facility maintenance and improvements, and safety supplies and equipment necessary to produce a safe Industrial Environment.*
4. *Provide for in-service training of teachers, administrators, school board members, and/or program advisory committees in the area of safety.*
5. *The implementation of 1 - 4 above should be consistent with Chapter 125.17, Page 10, The Education Reform Act of 1984, amended June 1986. Reads as follows:*

    B. Emergency Procedures

    C. Safety Procedures

        (1) Vocational and industrial shops or labs

        (2) Chemical - physical lab work

SYSTEM SAFETY COORDINATOR

Each school district should have a safety and health coordinator. Teachers and the building administrator could rely on this person for assistance and consultant in their accident prevention endeavors.

Suggested functions of the coordinator:

1. *Set up school safety committees.*
2. *Coordinate school safety committees.*
3. *Provide for and participate in school safety inspections.*
4. *Establish a communication system to keep teachers and administrators*

abreast of new standards and procedures.

5. Provide for and assist in establishing in-service workshops.

6. Provide for and assist in the implementation of safety instruction programs for students.

7. Provide for the assist in the investigation of and recording of accidents and injury.

8. Research special safety problems.

9. Obtain and disseminate regulatory materials (policies, guidelines, posters, etc.).

10. Maintain a liaison with the local governmental and industrial agencies and the Maine Departments of Education and Labor.

11. Analyze and report all accidents.

12. Initiate and maintain chemical identification and listings.

13. Coordinate the disposal of hazardous waste.

THE ADMINISTRATOR, PRINCIPAL, AND/OR DEPARTMENT HEAD

The individual school is the central unit of an educational system. Therefore, the building principal is likely to be the administrator who is most directly responsible for the school's Industrial Education laboratory program. If a specialized supervisor or department head functions with the principal and works directly with the teachers, some of the responsibilities for the safety program may be delegated.

THE TEACHER

The major responsibility for laboratory safety and health instruction falls on the teacher. Listed below are the responsibilities of a teacher in a comprehensive accident prevention program in school laboratories:

1. To incorporate safety and health instruction in the course of study and maintain documentation as to who received instruction and when it was given.

2. Present instruction on potential hazards and accident prevention specific to the particular school lab.

3. Develop specific safe practices, rules, and regulations relating to your facility and provide for their enforcement.

4. Keep informed of new and accepted safe practices for accident prevention.

5. *Provide proper instruction in the use of all tools, machines, and equipment. Keep a record of student's attendance, safety and health training, and safety evaluation.*

6. *Require new students in your program to receive safety instruction before working in the lab, this having specific reference to transfer students or students new to your class.*

7. *Set a good safety example for your students.*

8. *Require satisfactory eye protection be worn in the lab at all times.*

9. *Insist on proper protective equipment where necessary.*

10. *Provide and enforce safe housekeeping procedures.*

11. *Insist that guards are used and are of the accepted type.*

12. *Have set, pre-planned procedures in case of an accident or emergency.*

13. *Provide and use appropriate accident reporting forms.*

14. *Never leave the classroom unsupervised when students are present.*

15. *Be aware of the special-needs students with physical, mental, or medical deficiencies.*

16. *Constantly review your safety program and make recommendations for lab improvement to your administration when appropriate.*

17. *Be certain to include reference to your safety and health procedures in your end of the year report.*

THE STUDENT

Maine Public Schools
Department of Occupational/Technology Education

*School*_____

*Teacher*_____

*TO:*_____
Parent or Guardian

_____ *is enrolled in our Occupational/Technology Education Program and will have the opportunity to use various tools and equipment. Appropriate instruction in the safe operation of these tools and equipment is given and close supervision is maintained at all times. Although every precaution is taken to prevent accidents, a certain risk is involved due to the nature of the experience, the age of the student, and the learning environment.*

We are asking your cooperation in impressing upon your child, the importance of being careful. This we believe will back up the instruction that is given at school.

It should be noted that your signature on this form does not relieve the teacher or school administrators from their responsibilities to prevent negligence.

I have read the attached communication and I understand the type of program that my child is enrolled in. I will stress the safety aspects of this program to my child, and encourage him to participate fully in the program.

_____ _____
(Signature of Parent or Guardian) *(Date)*

*Phone:*_____*(Home)* _____*(Work)*

Please identify any health problems which may have a bearing on your child's participation in this class.

I agree to observe all safety rules and procedures for safe operation and conduct in the school Occupational/Technology Education labs and will wear approved eye protection at all times while working with power equipment.

_____ _____
(Signature of Student) *(Date)*

TEACHER LIABILITY

Teachers must in many situations exercise greater care to prevent injuries to their students than an ordinarily reasonable and prudent person may be expected to exercise. This occurs partly because school law provides that teachers stand "in loco parentis" (in place of the parent) and are personally liable for acts of negligence (while performing their duties as a teacher).

An act of negligence may be one directly committed by a teacher such as operating a piece of equipment during a demonstration without all safety devices in full functioning order and thereby injuring a student; or, negligence may be the failure to adequately supervise students during class activities or the omission of complete and thorough instruction in correct safety procedures for a given assignment. Either way, by omitting or committing an action a teacher may be negligent.

The following are a few general recommendations to avoid negligent acts:

1. *Supervise students to prevent them from injury to themselves or from injury caused by others.*

2. *Instruct students in proper manner of conducting inherently dangerous activities. Emphasize and periodically review all safety procedures.*

3. *Warn students of the specific dangers inherent in each classroom activity.*

4. *Keep machinery in proper working order especially its safety devices. If a machine is defective, do not use it and render it inoperable if possible.*

5. *Use discretion in the selection of participants for activities not under direct personal supervision.*

Teachers have this additional responsibility to enforce state policies and regulations adopted pursuant to this section. Familiarity with such district in general is imperative. Where a teacher is unaware of a rule, regulation, or policy governing his or her students' behavior and an accident occurs where ignorance of a rule pertinent to the behavior that resulted in the accident can be shown, the teacher has greatly increased his/her liability.

LAB PRACTICES LEADING TO LIABILITY OF INSTRUCTORS

Lab Practice	Administrative practices and instructional activities designed to eliminate such practice as a factor in teaching liability.
Absence of the teacher from the lab when students are working therein.	1. Never absent yourself from the lab while students are working in the shop. 2. Have clear understanding with your principal and/or supervisor that you are not to be called from the lab during a class session. 3. Only under extreme necessity should an instructor absent himself from the lab. When this occurs, lock the main switch box and provide a sedentary or reading assignment to students during your absence.
Teachers leaving the lab under the supervision of a teacher who is not qualified to teach shop work.	1. Teachers are liable to be absent for a period of time due to illness or attending a teachers' meeting or conference. It is the practice of school administrators to staff the lab with most any instructor, providing he/she has a free hour available. 2. Do not permit a substitute teacher in your lab unless he/she is a qualified or certified instructor. 3. If none is available, prepare written or reading assignments in advance, or some type of sedentary activity where they will be utilizing the machines and equipment in the lab. Instructional movies or similar aids are practical if they fit into the instructional program.

Permitting students not enrolled in the class to use lab equipment and tools.	*1. Permit only those students who have participated in your lab program or who are participating to use the shop and equipment therein.* *2. No exceptions should be made to this practice.* *3. Do not take the work of a student that he/she has had previous instruction on the tool or has had experience in their use.*
Permitting students to use machines or tools or to perform activities for which instruction has not been given.	*1. Make sure that proper instruction is given relative to each basic operation to be performed by a student in the lab classes.* *2. Permit no student to utilize a machine or tool in performing an operation for which instruction has not been given.* *3. Keep an accurate instructional log as to those materials, machines, and tools and operations pertaining thereto in which instruction has been given.*
Pupils using equipment in the lab which has not been approved by the administration and board of education.	*1. Allow no student to bring in any item of equipment for use in the lab.* *2. Permit students to use only those items of tools and machines that have been purchased with the approval of the Board of Education and School Administration.*
Permitting students to work in the lab free periods, particularly when the lab is not supervised.	*1. Do not be absent from your lab when students are working, even during unscheduled classes or periods.* *2. Permit students to utilize equipment and work in the lab during designated periods when proper supervision is given.*

Permitting students to use dull tools and/or cutting devices on machines.	*1. Periodically inspect all cutting edges of power tool devices and hand tools.*
	2. Keep all items of equipment properly maintained and sharpened.
	3. Demonstrate the proper maintenance and care of cutting edges of safe hand tools, particularly those jobs within the ability of the student to perform.
Permitting students to perform operations on machines without guard particularly when one could have been used.	*1. Provide proper instruction as to the use and adjustment of guards emphasizing the necessity and functions of such a device.*
	2. Set an example yourself, by using guards and safety devices at all times, and perform operations as you would want them performed by students.
	3. Require that students use guards at all times on machines when such devices can be used.
	4. Have students secure permission to use any item of equipment. This will permit you to check on the machines to see that all guards and safety devices are properly adjusted.
Allowing use of equipment by students who are prone to accidents or who possess physical abnormalities that may cause an accident.	*1. Be familiar with the work habits of students and with those who possess physical abnormalities which may necessitate restrictions being placed on their use of equipment.*
	2. Require all students to secure permission before the use of any item of equipment.
	3. Limit such students to the use of machines which are within their capabilities and commensurate with whatever physical abnormalities they possess.

Sending pupils outside the lab to perform activities for the school or other departments.	*1. Do not permit any students to leave the lab to perform activities outside the department.*
	2. Refuse to undertake projects or jobs that require the student to work away from the lab without your continuous supervision.
	3. Confine instructional and maintenance activities to those that can be performed in the lab.
Failure to keep accurate written reports relative to accidents.	*1. Prepare an accident form for your lab if the school system does not have a standard form.*
	2. Fill out the form as soon after the accident has taken place. Make multiple copies and keep one for yourself.
Failure to secure written statement from witnesses to lab accidents.	*1. Provide a place on your accident report form for the listing of witnesses.*
	2. Have witnesses write, in their own words, their views as to how the accident happened.
	3. Have witnesses sign their signature to their statement.
Failure to administer safety tests to students in case of liable suit for negligence.	*1. Administer safety tests to students upon completion of the demonstration of a specific machine, tool, or process.*
	2. Keep tests on file in your office as evidence that such material has been covered and that a test was actually administered over material.
	3. Set a critical score above which students must achieve in order to utilize a specific item of equipment. Many instructors demand a "perfect paper" prior to letting students use such equipment.

Failure of the teacher to exercise the utmost of caution.

1. The teacher MUST anticipate where and how an accident will occur, and utilize every means to eliminate the possibility of an accident occurring.

2. Make every possible effort to provide the safest possible physical facilities, and implement an effective safety instructional program.

Contributory Negligence

The term "contributory negligence" can be interpreted in a very broad sense. However, the following suggestions are given with a view in mind of eliminating the possibility of a teacher being charged with "contributory negligence:"

1. Maintain the safest of working conditions in the lab.

2. Insist on safe practices being adhered to at all times in the lab.

3. Provide complete and proper instruction in all aspects of lab work, with regard to the use of tools, machines, and materials.

4. Make recommendations to superiors as to improvements that can be made to improve safety conditions in the lab.

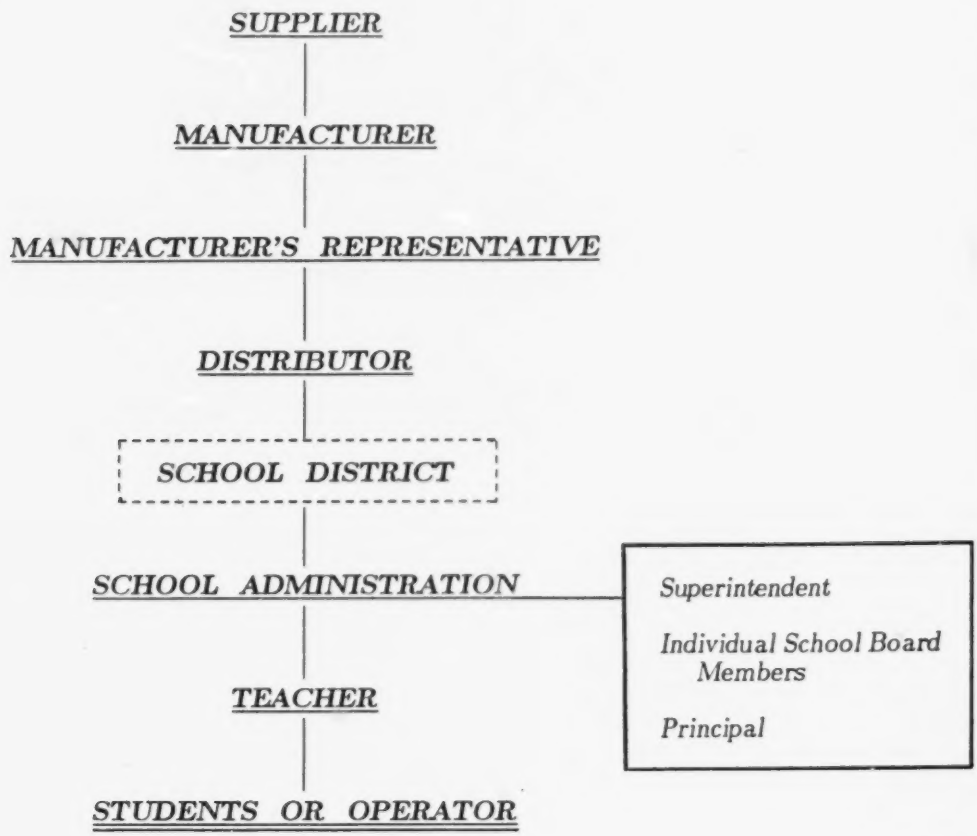
5. Make improvements suggested by your superiors.

6. Establish safety rules and enforce them.

7. Organize and implement a "complete" and continuous safety education program.

Failure to effectively administer a comprehensive eye safety program.	*1. Be familiar with and conversant about eye safety legislation.* *2. Require all students to wear eye protection devices at all times for laboratory activities.* *3. Know the appropriate eye safety device for each operation.* *4. Set an example yourself by always wearing the appropriate eye protection devices.*

THE LIABILITY CHAIN



EMERGENCY PROCEDURES

Any injury that occurs during Occupational/Technology Education activities and in the Occupational/Technology Education lab must be reported. This applies to after school accidents as well as those during the school day. Any injury, even a slight cut, must be reported since this indicates corrective action that must be taken by the teacher, administrator, or both.

A form for the reporting of these accidents can be adapted from the one on the following page. This form should be completed in triplicate; one for the principal, one for the school nurse, and one for the teacher's permanent file.

REPORTING AND ANALYSIS

1. *Require students to report all accidents and injury regardless of nature or severity.*

2. *Keep a record of all reported injury.*

3. *Analyze all reports for the purpose of aiding in the prevention of other injury.*

OCCUPATIONAL/TECHNOLOGY

EDUCATION DEPARTMENT
STUDENT ACCIDENT REPORT

Student Name _____ *Grade* _____

Location of Accident _____ *Time* _____ a.m. _/_ p.m.

Name of School _____

Date of Accident _____

Description of Injury _____

_____

Location of Instructor When Accident Occurred: _____

_____

Description of How Accident Happened: _____

_____

_____

Indicate Equipment, Machinery, or Tools Involved: _____

_____

Describe the Unsafe Practice, If any: _____

_____

Suggestions for Preventing Future Occurrence: _____

_____

First Aid Administered, If any: _____

_____

Who Administered the First Aid? _____

_____

Instructor's Signature: _____ *Date* _____

Student's Signature: _____ *Date* _____

SELECTED INJURIES AND FIRST AID TREATMENT

It is recommended that the instructor begin first-aid treatment as soon as possible after a student is injured.

Often assistance is required immediately as would be the case with a severe laceration. In this situation the instructor should employ only the proper first aid needed to stop the bleeding. However, it is not advisable to apply first aid beyond their means and capability, but seek qualified assistance, school nurse, local rescue, etc.

It is recommended that all Occupational/Technology educators be certified first-aid instructors or have successfully completed a first-aid course. The American Red Cross offers courses on a regular basis. Check with your local chapter.

The following is a guide for first-aid treatment of selected injuries which could occur in any industrial arts lab:

BURNS

Electrical Burns

- *Remove the source. If still energized, cut the power.*
- *Apply CPR if needed.*
- *Cool the area - cold water.*
- *Wet wrap if necessary.*
- *Send for medical assistance.*

Chemical Burns

- *Flush with water.*
- *Transport.*
- *Bring container or label information.*

Thermal Burns

- *Cool the area - cold water.*
- *Wet wrap if necessary.*
- *Transport.*

MAJOR LACERATIONS

Control Bleeding

- *Direct pressure.*
- *Pressure points if necessary.*
- *Never apply a tourniquet. (Unless loss of life is inevitable)*
- *Elevate.*

Send for Medical Assistance

EYES

Foreign Body

- *Seek immediate medical attention.*

Chemical

- *Flush with water.*
- *Transport.*
- *Bring container or label information.*

FRACTURES

Open Fracture

- *Control bleeding.*
- *Splint as it lies.*
- *Ice, if available.*

Closed Fracture

- *Splint as it lies.*
- *Ice, if available.*

Immunity from civil liability - Reference Page 17.08.

SAFETY FOR THE SPECIAL NEEDS STUDENTS

GENERAL STATEMENT

The instructor of Occupational/Technology Education subjects also has the responsibility to teach safety to the disadvantaged and handicapped students who enroll in his or her program. Many special needs students will require added instruction in safety with emphasis on personal responsibility to themselves and others with whom they work. This instruction can be provided after safety group sessions have been concluded.

Instructors must be alert at all times during lab sessions for unsafe conditions and actions by the special needs students, and should be ready to take necessary steps if needed. Other sections of the guide list specific safety procedures and lessons that the teacher should follow to instill safe working habits in the student with special needs.

SUGGESTED TECHNIQUES FOR HANDICAPPED STUDENTS

1. *Medical records should be checked to determine if any special students are subject to seizures, fainting spells, etc. If the teacher finds someone who has one of these conditions, that individual should be given additional monitoring while using all equipment.*

2. *Isolation of a special student when rules of the lab are violated has been found to be one of the most effective methods of discipline. One class period should be sufficient.*

3. *Special students have a tendency to wander about the lab area. They must understand that they have an area to which they are assigned and must stay there.*

4. *Test of special student's abilities should be done by continual observation by the teacher, and demonstrated by the student. Evaluation should not be limited to tests requiring reading, writing, and comprehension.*

5. *Jigs and fixtures should be designed to assist and promote a higher level of success while using tools and machines.*

6. *Minimize access barriers to sinks, cabinets, doorways, machines, etc.*

7. *Accept the child as he or she comes to you. Remember you are the key to the student's learning environment.*

8. *Employ the aid of Special Education resource people on your staff and in your system for assistance.*

9. *Keep in mind that special needs students respond very favorably to frequent verbal praise and positive reinforcement.*

ELEMENTARY

OCCUPATIONAL/TECHNOLOGY PROGRAMS

1. *Provide eye protection and require it be worn by all children in the lab or classroom. Soft vinyl mono-goggles seen to be preferred by younger children over standard safety glasses.*

2. *Whenever possible provide jigs and fixtures to hold work so that the child has both hands free.*

3. *Provide adult supervision on a one-to-one basis on power operated tools.*

4. *Use non-toxic finishing materials, such as olive or mineral oil rather than varnish.*

5. *Provide additional machine guards if necessary.*

6. *Consider key switches on any machinery that is not to be used by children.*

7. *Each child should be checked out on each machine or power hand tool.*

INDUSTRIAL MATERIALS

The scope of Industrial materials in our laboratories are indeed broad and it is not our intent to try and cover every area but to bring to the forefront some major concerns.

January 1, 1980, the state of Maine passed and put into effect Legislative Document 958, referred to as the Chemical Substance Identification Bill directed toward Industry in an effort to better protect the workers' health. Reference page 17.06.

Our primary concern in this section of our guide is the Occupational/Technology Education laboratory and the health concerns of those who work in them.

COMPRESSED GAS

Certainly the most commonly used gases for cutting and welding are oxygen and acetylene. However, you may also be using hydrogen, nitrogen, mapp gas, argon, helium, freon, ammonia, propane, carbon dioxide, or sulfur dioxide in some of your activities. To use them safely you should be aware of the following:

1. *Always know the characteristics of the gas you are using.*
2. *Read the label on each cylinder. There is not a standard color code for compressed gas bottles.*
3. *Treat compressed gas cylinders with respect. Careless handling may result in valve or cylinder damage and can produce instant death for you or your companions.*
4. *Students should not move cylinders without the use of a hand cart.*
5. *All compressed gas cylinders must be kept upright when in use.*
6. *Be sure that hoses, valves, and regulators are tightly secured and in good working order.*
7. *Shut off valves and regulators when not in use and bleed the line.*
8. *Try not to store spare gas cylinders but if you do, provide a well ventilated area separated by a fire resistant barrier, preferably outdoors.*
9. *Store your oxygen cylinders separate and apart from the acetylene cylinders as specified by code.*

10. When moving, transporting, or storing cylinders, cylinder caps must be in place.

11. Always have your instructor check your set-up before opening any valve.

12. Always work in well ventilated areas.

13. All gas cylinders must be secured and stored erect at all times.

DUST/FUMES

Dust and fumes found in the Occupational/Technology Education lab can be irritating and sometimes harmful. Some can be highly flammable or explosive and cause serious or permanent illness. It is important to control classroom exposure by:

1. Use adequate ventilation equipment to remove dusts from your work area.

2. Sweep or vacuum to properly dispose of dusts produced from manufacturing processes.

3. Wear an appropriate respirator when working on dust producing operations. Reference page 16.01.

4. Consult your instructor before cutting, welding, or grinding on galvanized metals.

5. Asbestos dust is a particular hazard that requires extra precaution when machining.

6. Metals such as magnesium are very unstable and should not be used.

7. When burning, welding, soldering, melting lead, zinc, and other materials, provide good ventilation.

OSHA Reference - 1910.94.

SOLVENTS

Remember all solvents are poisonous. There is really no such thing as a "safety" solvent. Some are worse than others, but every solvent should be treated with great caution.

Generally speaking, solvents can damage the body in four ways:

1. Skin irritation or disease

2. Irritation of eyes, nose, and throat

3. *Narcotic effect on the nervous system*

4. *Damage to internal organs*

All solvents can effect the nervous system through what is called "Narcosis" or "Depression of the Central Nervous System (CNS)." It is actually the brain itself which is effected by solvent and causes a variety of symptoms. The symptoms caused by this are varied:

Irritability	*Drunkenness*
Fatigue	*Nausea*
Headaches	*Staggering Gait*
Dizziness	*Unconsciousness*
Sleepiness	*Death*

(For additional information contact your nearest Industrial Hygienist or Safety Division, State of Maine.)

For Emergency Information, Call:

Maine Medical Center - Toll Free 1-800-442-6305
Portland, Maine (24 Hour Service)

Chemtrec - National Response Center for Chemical Emergencies
(24 Hour Service)
Washington, D. C. - Toll Free 1-800-424-9300

FLAMMABLE & COMBUSTIBLE LIQUIDS

1. *Always read the label on the container before using.*

2. *Be sure the exhaust fan or ventilation vents are operating in the area where flammable liquids are stored.*

3. *Avoid storing excessive amounts at any given time.*

4. *Dump waste or excessive materials into approved containers as directed by your instructor.*

5. *Use a funnel when pouring and static wire whenever possible.*

6. *Wear eye protection when pouring materials.*

7. *Read and follow instructions for handling and mixing catalysts with resins and finishes.*

8. *Never pour catalyst back into the bottle.*

9. *Never apply resin, paint, or other finishing material near areas used for cutting, welding, grinding, soldering, or other hot work.*

10. *Be sure your work area is ventilated.*

11. *Store solvents in approved containers.*

12. *Wear rubber gloves to avoid skin irritation.*

13. *Wash hands and other exposed skin areas before leaving your lab.*

14. *Have an approved container for used rags.*

15. *Be sure to have the proper fire extinguisher in the immediate area.*

(Some of the more hazardous liquids you may encounter in your lab.)

Listed in approximate order of hazard:

1. *Starting Fluid*
2. *Gasoline*
3. *Aerosol Cans**
4. *Catalysts ** Like M.E.K. Peroxide*
5. *Carburetor Cleaner*
6. *Acetone*
7. *Lacquer Thinner*
8. *Adhering Liquid (For Silk-Screen Process)*
9. *Paint Thinner*
10. *Alcohol*
11. *Shellac*
12. *Japan Drier**
13. *Kerosene*
14. *Paint*

15. *Resin (Polyester)*

16. *Stain & Varnish*

17. *Danish Oil*

* *These materials could accelerate spontaneous combustion or could react violently when mixed with organic matter. (Consult your instructor)*

** *The hazard could vary greatly depending upon the propellant used in the can. (Consult your instructor)*

CHEMICALS AND HAZARDOUS WASTE

CHEMICAL LISTING

Maine's Chemical Substance Legislation requires us to identify chemical hazards in the workplace, which certainly includes our school shops and/or labs.

What is hazardous? What should be identified? Any chemical or substance which is:

- *A hazardous substance*
- *A toxic substance*
- *Or, a substance likely to be inhaled, ingested, or absorbed through the skin.*

A good rule of thumb would be any substance which is foreign to the human body is hazardous. Often we are only concerned with liquid substances but solid materials are also to be included. An example would be any form or type of metal sheet. One reason being it is coated with a protective substance which in turn might be toxic if taken into the system.

By law we should be doing the following:

1. *Developing and identifying a list of chemicals or substances we use.*
2. *Collecting and organizing material safety data sheets for each item we identify.*
3. *Clearly label all the identified substances, including all containers not having a manufacturers label.*
4. *Submit a listing to your administration and in turn to the State of Maine.*
5. *Be aware of first aid procedures as indicated on the MSDS sheets.*

A copy of Legislative Document 958 and Chapter 22 are included in the Technical Reference Material Section, Page 17.06.

HAZARDOUS WASTE DISPOSAL

The State does have a hazardous waste standards program and is handled by the Department of Environmental Protection, Bureau of Oil and Hazardous Materials Control in Augusta.

All persons or establishments (schools) that generate hazardous waste, as defined in Chapter 850, fall within the regulated community.

Schools fall into the category of a Small Quantity Generator (SQG). In other words, a generator producing less than 100 kilograms (200 pounds or approximately 27 gallons) of hazardous waste including no more than 1 kg (about 2 pounds) of acutely hazardous waste in any calendar month or if it accumulates, at any one time, no more than 100 kg of hazardous waste or 1 kg of acutely hazardous waste.

Acutely hazardous - see page 8.02.

What We (Schools) Must Do To Be In Compliance?

Chapter 850, Section 3A(5)

1. *Determine if the waste generated is hazardous.*

   Example: Used Paint Thinner

2. *Properly label all containers of accumulated hazardous waste being stored.*

3. *Temporary storage of H.W. should be stored in proper containers.*

4. *Must properly package hazardous waste for shipment. DOT approved containers must be used.*

5. *A uniform hazardous waste manifest must be used. A sample manifest title page is included in the technical reference material section. Page 17.16.*

6. *Use a licensed H.W. transporter. A list of transporters in Maine is included, page 17.17. A more detailed list is available through the Maine D.E.P., Augusta. This list is current as of June 1987.*

7. *Ship to a licensed hazardous waste facility.*

8. *Do not exceed the monthly generation limits or the one-site accumulations.*

(Additional Concern Area)

If it is not a liquid but is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns so vigorously and persistently that it created a hazard and should be disposed of in the aforementioned manner. Example: Dry spray booth filters.

(Acutely Hazardous Waste)

Acutely H.W. more often than not might be found in chemistry labs and would be those listed as "P" wastes in Maine Chapter 850, Section 3C(4), pp. 27-33.

PERSONAL PROTECTIVE EQUIPMENT

Code of Federal Regulations - OSHA 1910.132-140

HEAD PROTECTION

In the labs where building construction is part of the curriculum provide your students with head protection. The protection must meet the recommendations in ANSI, Z89.1. Also students in the building trades should wear protection on off-school sites. (OSHA 1910.135)

FOOT PROTECTION

Once again any labs having building construction should recommend the use of foot protection as put forth by ANSI recommendations Z41.1. (OSHA 1910.136)

CLOTHING

Would include gloves, aprons, and clothing type articles. Gloves and arm protectors should be used to prevent lacerations from handling sharp objects, to prevent chemical contact or to prevent burns. For welding, a leather glove extending well over the wrist is recommended. For protection against acids, solvents, chemicals, etc., an appropriate impermeable glove should be used, rubber or plastic.

Gloves should not be used around moving machinery.

RESPIRATORY PROTECTION

Approved respirators must be provided by the school when the workplace air is contaminated with excessive concentrations of harmful dusts, fumes, mists, gases, or vapors. See page 17.01 for specific details. (OSHA 1910.134)

EYE PROTECTION

State of Maine regulation requires instructors to provide and make mandatory that all persons wear quality eye protection devices while participating in any of the following activities, or observing within the area of such activities:

Industrial, Technical, Scientific Lab, Shops, or Facilities involving experiences in which:

1. *Any solid material, part or particle thereof, may dislodge or otherwise form a dangerous projectile. (Mechanical operations, as sawing, trimming, abrading, grinding, etc.)*

2. *Any process or operation involving hot molten metal may be conducted.*

3. *Any caustic, explosive, or otherwise hazardous chemical, or injurious radiation may be present.*

4. *Any process or operation involving injurious light and/or heat radiations (Welding, Heat Treating, Casting, etc.) may be conducted. See SELECTION CHART page 17.13. The protection recommendation comes from the U.S. Standards, Z2.1.*

(OSHA 1910.133)

HAND TOOL SAFETY

1. *Wear adequate eye protection devices when in potential eye hazard areas.*
2. *Select the proper size and type tool for the process.*
3. *Be sure cutting tools are sharp and in good condition.*
4. *Keep your hands free of grease and oil.*
5. *Handle sharp-edged and pointed tools carefully.*
6. *Secure your stock in a vise or clamp when working on it.*
7. *Do not use tools with cracked handles, or loose handles.*
8. *Keep punches and chisels in good condition. Mushroomed heads may chip and cause injury.*
9. *Use a file only if it has a handle on it.*
10. *Never pry, hammer on, or hammer with a file; it may shatter.*
11. *Do not use chisels as or screw drivers to pry with.*
12. *Use the proper wrench and wrench size for the job.*
13. *When finishing with a handtool clean it and return it to its proper place.*
14. *Report any damage or malfunctioning tools to your instructor.*

(OSHA 1910.242)

GENERAL LABORATORY SAFETY

1. *Wear eye protection.*
2. *Wear suitable clothing.*
3. *Obey rules concerning operator machine safety zones.*
4. *Keep tools and materials from projecting over the edge of tables, work surfaces, and storage areas.*
5. *Keep tools in their proper storage place.*
6. *Keep floor surfaces clear of scraps and litter.*
7. *Absolutely no horseplay.*
8. *Place oily rags and other combustible materials in approved containers.*
9. *Use care in lifting and handling material stock.*
10. *Avoid loose, dangling clothing when working around machines.*
11. *Do not wear rings while working in the lab.*
12. *Do not wear bracelets, necklaces, or loose jewelry.*
13. *Use compressed air properly and under controlled conditions.*

NATIONAL STANDARD SCHOOL SHOP SAFETY INSPECTION CHECK LIST

Prepared by the Joint Safety Committee of the
AMERICAN VOCATIONAL ASSOCIATION — NATIONAL SAFETY COUNCIL

_____ Date _____

_____

INTRODUCTION

A safe environment is an essential part of the school shop safety education program. The safe environment will exist only if hazards are discovered and corrected through *regular* and *frequent* inspections by school personnel—administrators, teachers and students. Safety inspections are to determine if everything is satisfactory.

Inspections may be made at the request of the board of education, the school administration or upon the initiative of the teacher. Some communities have drawn upon the cooperative service of professional safety engineers, inspectors of state labor departments, insurance companies and local safety councils to supplement and confirm inspections by school personnel.

The National Standard School Shop Safety Inspection Check List, recommended by the President's Conference on Industrial Safety is an objective inspection procedure for the school shop.

DIRECTIONS

WHO INSPECTS?

This will depend upon local policies. It is recommended, however, that shop teachers, and students—the student safety engineer and/or student safety committee—participate in making regular inspections. This not only tends to share responsibility but stimulates a broader interest in the maintenance of a safe school shop.

WHEN TO INSPECT?

As a minimum, a safety inspection should be made at the beginning of every school term or semester. More frequent inspections may be advisable.

HOW TO INSPECT?

Inspections should be well planned in advance.

Inspections should be systematic and thorough. No location that may contain a hazard should be overlooked.

Inspection reports should be clear and concise, but with sufficient explanation to make each recommendation for improvement understandable.

FOLLOW-UP

The current report should be compared with previous records to determine progress. The report should be studied in terms of the accident situation so that special attention can be given to those conditions and locations which are accident producers.

Each unsafe condition should be corrected as soon as possible in accordance with accepted local procedures.

A definite policy should be established in regard to taking materials and equipment out of service because of unsafe conditions.

The inspection report can be used to advantage as the subject for staff and class discussion.

CHECKING PROCEDURE

Draw a circle around the appropriate letter, using the following letter scheme:

S — Satisfactory (needs no attention)
A — Acceptable (needs some attention)
U — Unsatisfactory (needs immediate attention)

Recommendations should be made in all cases where a "U" is circled. Space is provided at the end of the form for such comments. Designate the items covered by the recommendations, using the code number applicable (as B-1).

In most categories, space is provided for listing of standards, requirements or regulations which have local application only.

A. GENERAL PHYSICAL CONDITION

1. Machines, benches, and other equipment are arranged so as to conform to good safety practices ..... S A U
2. Condition of stairways ..... S A U
3. Condition of aisles ..... S A U
4. Condition of floors ..... S A U
5. Condition of walls, windows, and ceiling ..... S A U
6. Illumination is safe, sufficient, and well placed ..... S A U
7. Ventilation is adequate and proper for conditions ..... S A U
8. Temperature control ..... S A U
9. Fire extinguishers are of proper type, adequately supplied, properly located and maintained ..... S A U
10. Teacher and pupils know location of and how to use proper type for various fires ..... S A U
11. Number and location of exits is adequate and properly identified ..... S A U
12. Proper procedures have been formulated for emptying the room of pupils and taking adequate precautions in case of emergencies S A U
13. Lockers are inspected regularly for cleanliness and fire hazards. S A U
14. Locker doors are kept closed ..... S A U
15. Walls are clear of objects that might fall ..... S A U
16. Utility lines are properly identified ..... S A U
17. Teachers know the procedure in the event of fire including notification of the fire department and the evacuation of the building. S A U
18. Air in shop is free from excessive dust, smoke, etc. .... S A U
19. _____ S A U
20. _____ S A U
21. _____ S A U
22. _____ S A U
23. Evaluation for the total rating of A. GENERAL PHYSICAL CONDITION ..... S A U

B. HOUSEKEEPING

1. General appearance as to orderliness ..... S A U
2. Adequate and proper storage space for tools and materials. S A U
3. Benches are kept orderly ..... S A U
4. Corners are clean and clear ..... S A U
5. Special tool racks, in orderly condition, and provided at benches and machines ..... S A U
6. Tool, supply, and/or material room is orderly ..... S A U
7. Sufficient scrap boxes are provided ..... S A U
8. Scrap stock is put in scrap boxes promptly ..... S A U
9. Materials are stored in an orderly and safe condition .. S A U
10. A spring lid metal container is provided for waste and oily rags. S A U
11. All waste materials and oily rags are promptly placed in the containers ..... S A U
12. Containers for oily rags and waste materials are frequently and regularly emptied ..... S A U
13. Dangerous materials are stored in metal cabinets ..... S A U
14. Machines have been color conditioned ..... S A U
15. Safety cans are provided for flammable liquids ..... S A U
16. Bulk storage of dangerous materials is provided outside of the main building ..... S A U
17. A toe-board or railing around a mezzanine used for storage or washing facilities ..... S A U
18. Materials are stored in an orderly and safe condition on this mezzanine ..... S A U
19. Flammable liquids are not used for cleaning purposes S A U
20. Floors are free of oil, water and foreign material ..... S A U
21. Floors, walls, windows, and ceilings are cleaned periodically. S A U
22. _____ S A U
23. _____ S A U
24. _____ S A U
25. _____ S A U
26. Evaluation for the total rating for B. HOUSEKEEPING S A U

C. EQUIPMENT

1. Machines are arranged so that workers are protected from hazards of other machines, passing students, etc. ..... S A U
2. Danger zones are properly indicated and guarded ..... S A U
3. All gears, moving belts, etc., are protected by permanent enclosure guards ..... S A U
4. All guards are used as much as possible ..... S A U

C. EQUIPMENT (continued)

5. All equipment control switches are easily available to operator. S A U
6. All machines are "locked off" when instructor is out of the room. S A U
7. Brushes are used for cleaning equipment ..... S A U
8. Nonskid areas are provided around machines ..... S A U
9. Machines are in safe working condition ..... S A U
10. Machines are guarded to comply with American Standards Association and local state code ..... S A U
11. Adequate supervision is maintained when students are using machines and dangerous tools ..... S A U
12. Tools are kept sharp, clean and in safe working order S A U
13. All hoisting devices are in safe operating condition ... S A U
14. Machines are shut off while unattended ..... S A U
15. Adequate storage facilities for tools, equipment, etc., not in immediate use ..... S A U
16. _____ S A U
17. _____ S A U
18. _____ S A U
19. _____ S A U
20. Evaluation for the total rating for C. EQUIPMENT S A U

D. ELECTRICAL INSTALLATION

1. All switches are enclosed ..... S A U
2. There is a master control switch for all of the electrical installations ..... S A U
3. Electrical outlets and circuits are properly identified S A U
4. All electrical extension cords are in safe condition and are not carrying excessive loads ..... S A U
5. All machine switches are within easy reach of the operators. S A U
6. Electrical motors and equipment are wired to comply with the National Electric Code ..... S A U
7. Individual cut-off switches are provided for each machine. S A U
8. Machines are provided with overload and underload controls by magnetic pushbutton controls ..... S A U
9. No temporary wiring in evidence ..... S A U
10. _____ S A U
11. _____ S A U
12. _____ S A U
13. _____ S A U
14. Evaluation for the total rating for D. ELECTRICAL INSTALLATION ..... S A U

E. GAS

1. Gas flow to appliances is regulated, so that when appliance valve is turned on full, the flames are not too high ..... S A U

2. Gas appliances are properly insulated with asbestos or other insulating material from tables, benches, adjacent walls, or other flammable materials ..... S A U

3. No gas hose is used where pipe connections could be made. S A U

4. Gas appliances have been adjusted so that they may be lighted without undue hazard ..... S A U

5. Students have been instructed when lighting gas appliances to light the match first before turning on the gas ..... S A U

6. There are no gas leaks, nor is any odor of gas detectable in any part of the shop ..... S A U

7. Shop instruction has been given concerning the lighting of gas furnaces operating with both air and gas under pressure .. S A U

8. When lighting the gas forge, goggles are worn ..... S A U

9. When lighting the gas furnace, the following procedure is used: (a) light the match; (b) turn on the gas; (c) drop the match in the hole in top of the furnace ..... S A U

10. In shutting down the gas furnace, the gas valve is closed before the air valve ..... S A U

11. _____ S A U

12. _____ S A U

13. _____ S A U

14. _____ S A U

15. Evaluation for the total rating for E. GAS ..... S A U

F. PERSONAL PROTECTION

1. Goggles or protective shields are provided and required for all work where eye hazards exist ..... S A U

2. If individual goggles are not provided, hoods and goggles are properly disinfected before use ..... S A U

3. Shields and goggles are provided for electric welding .. S A U

4. Rings and other jewelry are removed by pupils when working in the shop ..... S A U

5. Proper kind of wearing apparel is worn and worn properly for the job being done ..... S A U

6. Leggings, safety shoes, etc., are worn in special classes such as foundry, etc., when needed ..... S A U

7. Respirators are provided for dusty or toxic atmospheric conditions such as when spraying in the finishing room ..... S A U

8. Provisions are made for cleaning and sterilizing respirators. S A U

9. Students are examined for safety knowledge ability .. S A U

10. Sleeves are rolled above elbows when operating machines. S A U

11. Clothing of students is free from loose sleeves, flopping ties, loose coats, etc. ..... S A U

12. _____ S A U

F. PERSONAL PROTECTION (continued)

13. _____ S A U

14. _____ S A U

15. _____ S A U

16. Evaluation for the total rating for F. PERSONAL PROTECTION. S A U

G. INSTRUCTION

1. Shop Safety is taught as an integral part of each teaching unit. S A U

2. Safety rules are posted particularly at each danger station. S A U

3. Printed safety rules are given each student ..... S A U

4. Pupils take a safety pledge ..... S A U

5. Use of a safety inspector ..... S A U

6. Use of a student shop safety committee ..... S A U

7. Use of safety contests ..... S A U

8. Motion and/or slide films on safety are used in the instruction. S A U

9. Use of suggestion box ..... S A U

10. Use of safety tests ..... S A U

11. Use of safety posters ..... S A U

12. Talks on safety are given to the classes by industrial men. S A U

13. Tours are taken of industrial plants as a means of studying safety practices ..... S A U

14. Periodic safety inspections of the shop are made by a student committee ..... S A U

15. Men from industry make safety inspections of the shop S A U

16. Student shop safety committee investigates all accidents S A U

17. A proper record is kept of safety instructions which are given, preferably showing the signature of student on tests given in this area ..... S A U

18. Rotate students on the Shop Safety Committee so that as many students as possible have an opportunity to participate ... S A U

19. _____ S A U

20. _____ S A U

21. _____ S A U

22. _____ S A U

23. Evaluation for the total rating of G. INSTRUCTION S A U

H. ACCIDENT RECORDS

1. There is a written statement outlining the proper procedure when and if a student is seriously hurt ..... S A U

2. Adequate accident statistics are kept ..... S A U

3. Accidents are reported to the proper administrative authority by the instructor ..... S A U

H. ACCIDENT RECORD (continued)

4. A copy of each accident report is filed with the State Department of Education ..... S A U

5. Accident reports are analyzed for instructional purposes and to furnish the basis for elimination of hazards..... S A U

6. _____ S A U

7. _____ S A U

8. _____ S A U

9. _____ S A U

10. Evaluation for the total rating of H. ACCIDENT RECORDS. S A U

I. FIRST AID

1. An adequately stocked first aid cabinet is provided... S A U

2. The first aid is administered by a qualified individual S A U

3. The school has individuals qualified to administer first aid. S A U

4. _____ S A U

5. _____ S A U

6. _____ S A U

7. _____ S A U

8. Evaluation for the total rating of I. FIRST AID.... S A U

RECOMMENDATIONS

Code No.	

For additional copies in packets of 50 send $1.42 to National Safety Council, 425 North Michigan Avenue, Chicago, Ill. 60611

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MACHINE ORIENTATION

1. *MACHINE IN GOOD CONDITION*
2. *ALL GUARDS IN PLACE AND WORKING*
3. *TOOLS SHARP*
4. *SAFETY DEVICES AT MACHINES*
5. *WORK AREA MARKED OFF*
6. *PROPER LIGHT AND VENTILATION*
7. *PERSONAL PROTECTIVE DEVICES IN USE*
8. *RIGHT MACHINE FOR THE JOB*
9. *PROPER SET-UP*
10. *CLEAN AREA AND MACHINE*
11. *STOCK FREE OF DANGER FLAWS*
12. *KICKBACK MACHINES NOT AIMED AT WORK AREAS OR AISLES*

SAMPLE PREVENTIVE MAINTENANCE CHART

(JOINTER)

Monthly

[ ] *Inspect entire machine for loose bolts, nuts, and screws. Tighten and replace as necessary.*

[ ] *Thoroughly clean in and around machine, removing chips and shavings with a soft bristle brush.*

[ ] *Remove foreign matter from cutterhead and table surface with oven cleaner.*

[ ] *Clean table surface if rusted using a paste mixture of household ammonia and a good commercial powdered detergent. Scrub table with this mixture and 000 steel wool removing as much surface rust as possible. Wash with warm water and dry immediately. Coat surface of table with Johnson's baby powder and briskly rub in with a clean blackboard eraser. This polishes table and forms a rust barrier. Repeat talc treatment weekly for 6 weeks, then monthly.*

[ ] *Check level of tables with a good steel straightedge. Refer to Instruction Manual for leveling procedures.*

[ ] *Check fence for: 1. Looseness. Tighten as necessary.*
2. Straightness. If warped, refer to manual for straightening procedures.
3. Perpendicular to table. Reset if required.

[ ] *Check fence stops at 45% and 90% positions. Readjust as necessary.*

[ ] *Check knives for sharpness, nicks, and tightness within cutterhead slot. Refer to manual if sharpening is required. Be sure knives parallel outfeed table.*

[ ] *Check belts for wear or hard spots and replace as necessary. Check belt tension. No more or less that 1" play midway between pulley centers is permitted.*

[ ] *Check cutterhead bearings. Replace any bad or suspect bearings immediately.*

[ ] *Lubricate as follows:*

	FREQUENCY	*LUBRICANT*
Table ways	*Monthly*	*Fiske Lubriplate 630AA*
Table raising screws	*Monthly*	*Fiske Lubriplate 630AA*
Fence table slide	*Monthly*	*Fiske Lubriplate 630AA*

Cutterhead bearings require no lubrication.

MACHINE SAFETY

(Guidelines/Test)

12.00

MACHINE SAFETY
Content Sheet

Machine safety for the Vocational Industrial Arts/Technology Education laboratories is combined but divided according to the three conceptional instructional areas found throughout the majority of laboratories in the State:

- *Manufacturing and Construction*
- *Power and Transportation*
- *Graphics and Graphic Arts*

Each machine safety sheet serves three purposes:

1. *To provide a suggested list of tips for the student.*
2. *To provide the instructor a form by which each student can be tested and evaluated.*
3. *The test, after evaluation, becomes a part of the permanent records. The instructor has signed and dated the test upon successful student completion.*

INSTRUCTORS PLEASE NOTE

The enclosed safety sheets have been restricted in content length for the reason that space is limited. What is provided gives you a good beginning for additional content and development of your machine safety instructional materials.

The following machines will have an individual safety sheet and separate test according to the concept area it is identified with:

(Manufacturing-Construction)

Jointer
Bandsaw
Radial Arm Saw
Circular Saw (Table)
Planer-Surfacer
Wood Lathe
Wood Shaper
Drill Press
Uniplane
Disc Sander
Motorized Miter Box
Overarm Router
Scroll Saw
Buffer
Power Hacksaw
Horizontal Band Saw
Pedestal Grinder
Gas Forge
Crucible Furnace
Metal Lathe
Horizontal Milling Machine
Vertical Milling Machine
Metal Shaper
Squaring Shears
Sheet Metal Machines
Arc Welder
Tig & Mig Welder
Oxy-Acetylene Welder
Spinning Lathe
Plastics Technology
Plastics Extrusion
Injection Molding
Compression Molding
Electric Discharge Machine

(Graphics-Graphic Arts)

Developing Machines
Plate Maker
Offset Printing Press
Paper Cutter
Platen Printing Press
Paper Drill
Stapler & Stitcher
Paper Folder

(Energy-Transportation)

Lifts-Floor Jacks
Battery Charger
Hydraulic Training Unit
Small Engine Analyzer
Crane or Chain Hoist
Hydraulic Press

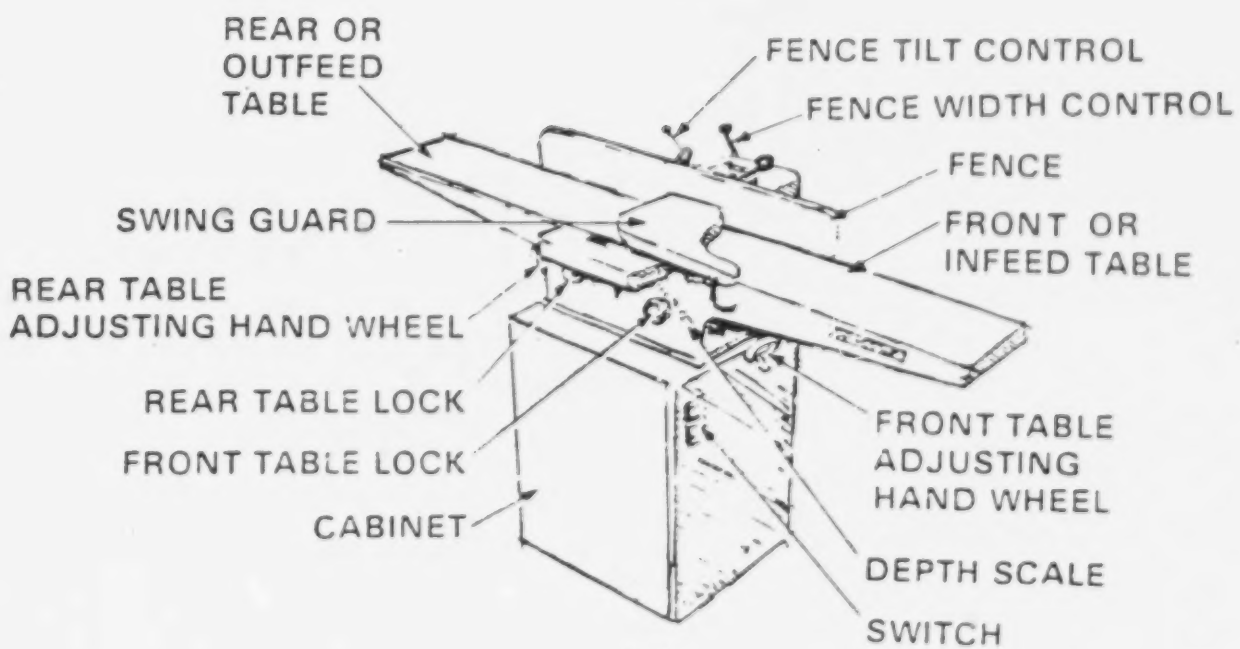
SPECIFIC FOCUS TO CNC EQUIPMENT

Associated with many of the above mentioned machines are computer numerical controlled equipment. With this new technology also comes additional operator hazards, some of which are listed in the Safety In Special Attention Areas. Page 14.02.

MANUFACTURING - CONSTRUCTION

Safety Tips: **JOINTER**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make all adjustments with the power off.*
6. *Use a push stick or block when hands would pass over or within 2" of the cutter head.*
7. *Make several light cuts (1/16" to 1/8") instead of a heavy cut (1/2").*
8. *The absolute minimum length of material that may be jointed is twice the size of the knives - 6" knives, 12".*
9. *Do not adjust or move the rear table without instructor permission.*
10. *Knives should be sharp, often a chattering noise is a sign of dull knives.*



JOINTER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

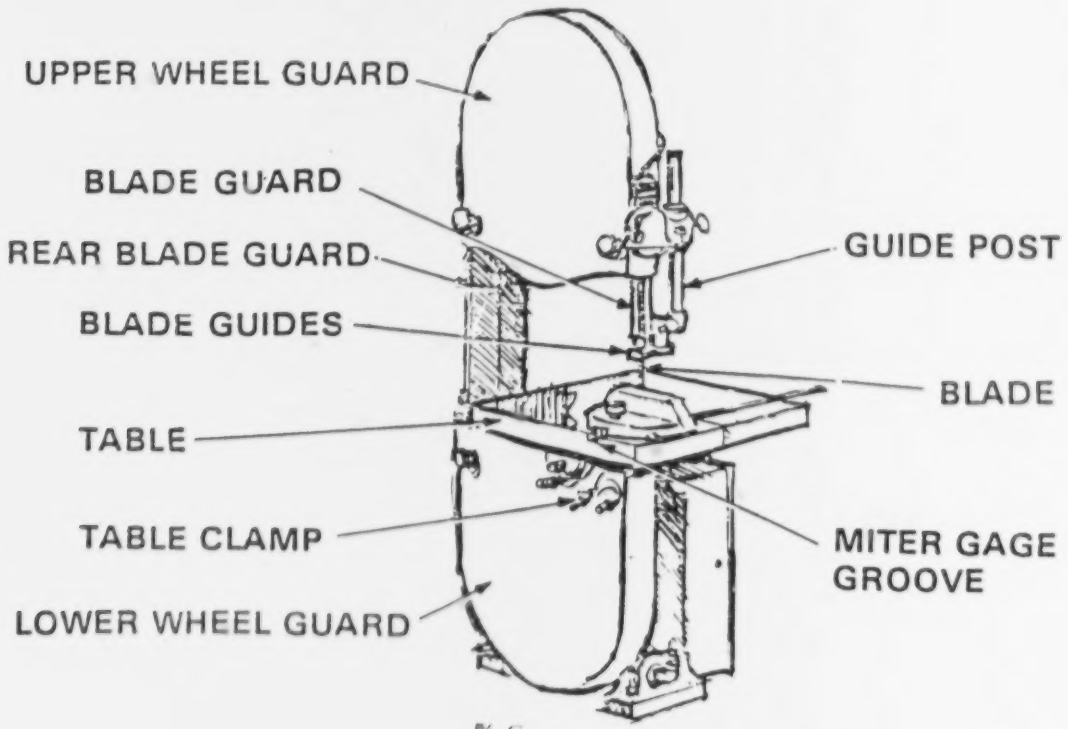
SAFETY QUIZ *(Circle True or False)*

1. *It is possible for the guards to stick and not cover the cutter.*	T	F
2. *A push stick should be used when the hands could get close to the knives.*	T	F
3. *Eye protection is not needed when operating this machine.*	T	F
4. *Permission should be obtained before using the jointer.*	T	F
5. *Stock shorter than 6" may be processed on the six inch jointer.*	T	F
6. *In order to remove 3/8" you should make three passes 1/8" deep, rather than attempt one cut 3/8" deep.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: **BANDSAW**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make sure all adjustments are tight and secure and blade guides are properly adjusted.*
6. *Upper blade guides should be positioned about 1/8" above the workplace.*
7. *Guide the work slowly, letting the machine do the work. Do not force feed the work into the blade.*
8. *Do not attempt to cut a smaller radius than the blade will allow.*
9. *Avoid backing out of a cut.*
10. *Place hands or fingers on each side of the cut line, never on the line. Use a scrap push block if necessary.*
11. *Never leave the machine until it has come to a full stop.*



12.05

BANDSAW

Student Name _____

Class _____

Date _____ *Grade* _____

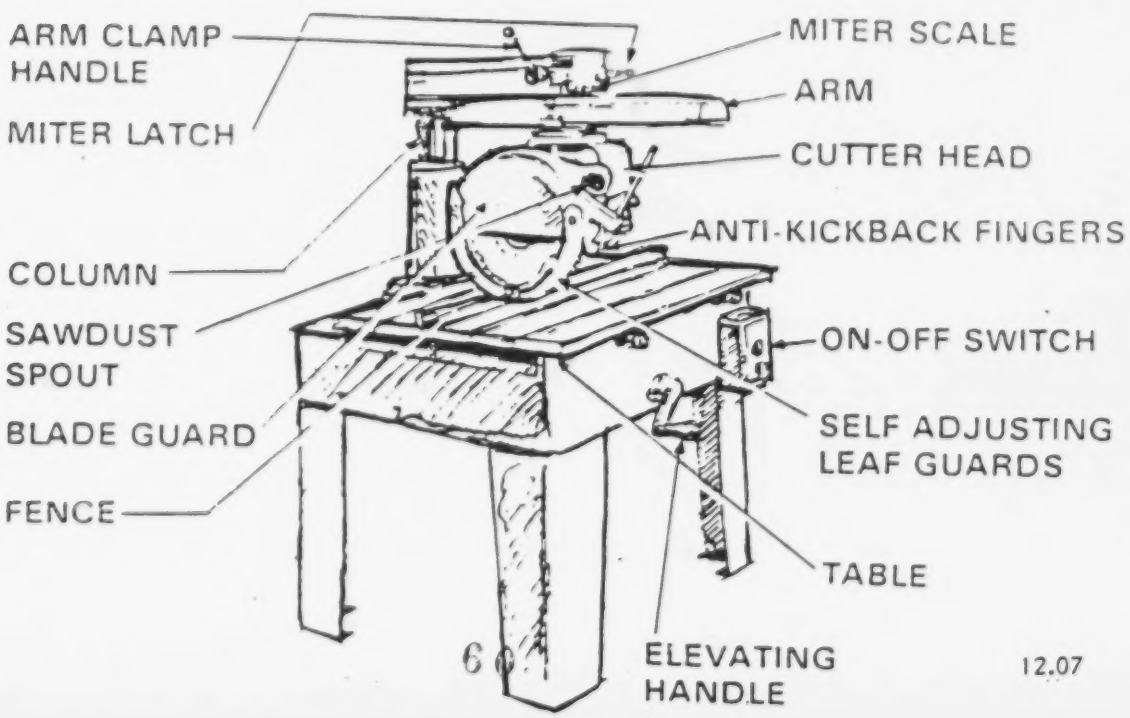
Instructor's Name _____

SAFETY QUIZ *(Circle True or False)*

1. *The lower wheel does not require a guard.*	T	F
2. *The upper guide should be adjusted to within 1/8" of the work piece.*	T	F
3. *All normal adjustments should be made with the power turned off.*	T	F
4. *It is permissible and safe to force the material around a tight radius.*	T	F
5. *Fingers should be placed on each side of the cut line and the material guided through the machine.*	T	F
6. *When necessary, it is possible to back slowly out of a cut.*	T	F

Safety Tips: **<u>*RADIAL ARM SAW*</u>**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make all adjustments with the power off.*
6. *Be sure the leaf guards are operating properly and the blade will not extend beyond the table edge.*
7. *When cross cutting, hold the material securely against the fence.*
8. *Always pull the blade through the work and return the cutter head behind the fence before removing material or starting the next cut.*
9. *Make sure the blade guard and kickback fingers are properly adjusted before ripping.*
10. *Always rip into the blade, never in the same direction as the rotation.*
11. *Make sure the blade has stopped before leaving the machine.*
12. *Be aware of scrap pieces kicking back when cross cutting.*



RADIAL ARM SAW

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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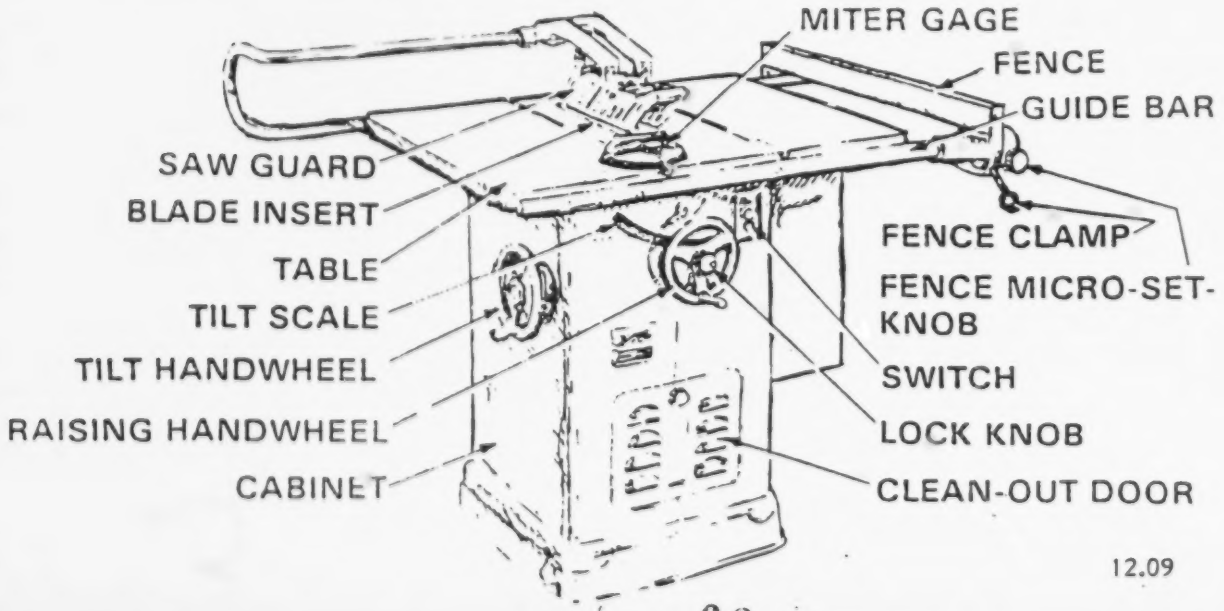
SAFETY QUIZ *(Circle True or False)*

1. *Eye protection is not necessary except when ripping.*	T	F
2. *The guard and kickback fingers must be in place when ripping.*	T	F
3. *The saw blade may safely extend beyond the table.*	T	F
4. *The blade should be installed so that in cross cut position the teeth at the bottom of the blade point away from the operator.*	T	F
5. *When ripping, one hand must hold the material and the other hand operate the saw.*	T	F
6. *In cross cutting, the saw would be returned to the rear of the arm upon the completion of each cut.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***CIRCULAR SAW***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating.*
4. *Always use proper eye protection.*
5. *Make all adjustments and remove chips or dust with the power off.*
6. *Never use the miter gage and fence together in the same operation.*
7. *The saw blade should extend above the work piece 1/8 of an inch.*
8. *Never saw freehand. Use the miter gage when cross cutting, the fence when ripping, and/or approved fixtures or jigs.*
9. *Never reach over the saw blade.*
10. *Use extra care and precaution when sawing large material, or when using a dado or molding cutter head.*
11. *Use a push stick when ripping narrow stock or when hands would be close to blade.*
12. *Do not stand in line of the cut when operating the saw.*
13. *Lower the blade and be sure it has come to a full stop before leaving the machine.*
14. *Always be aware of your hand placement and scrap kickback.*
15. *When ripping, control long stock with helper assistance or a roller stand.*



12.09

CIRCULAR SAW

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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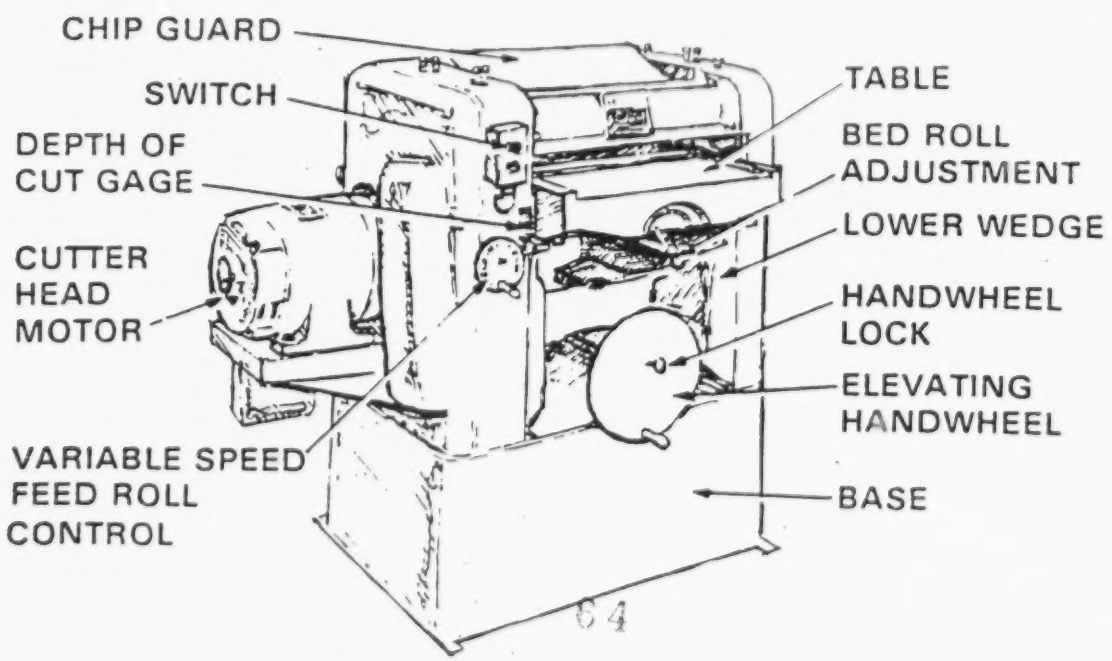
SAFETY QUIZ *(Circle True or False)*

1. *It is safe to saw freehand.*	T	F
2. *The fence should always be used.*	T	F
3. *The guard is not always necessary.*	T	F
4. *When ripping, it is best to stand directly behind the blade.*	T	F
5. *Eye protection should be worn when using a table saw.*	T	F
6. *The saw blade should be adjusted so that the teeth clear the thickness of material to the depth of the gullets.*	T	F
7. *A helper or roller stand should be used when ripping low pieces.*	T	F
8. *A push stick is necessary when ripping narrow stock.*	T	F

Safety Tips: **PLANER-SURFACER**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure to check all material for loose knots, nails, and other foreign objects.*
6. *Do not force stock through the planer. Keep hands off the material and let the power feed operate.*
7. *Select the proper depth of cut and the rate of speed depending on the stock being planed.*
8. *Thin stock should be properly supported by a jig or back up board. Check with the instructor for minimum thickness and length.*
9. *Never look directly into the throat of a planer at table level while it is running or in operation.*
10. *Remove shavings or chips when the power is turned off. Keep hands away from chip guard and the point of operation.*
11. *Do not stand directly in front of the machine in line of possible kick back.*



PLANER-SURFACER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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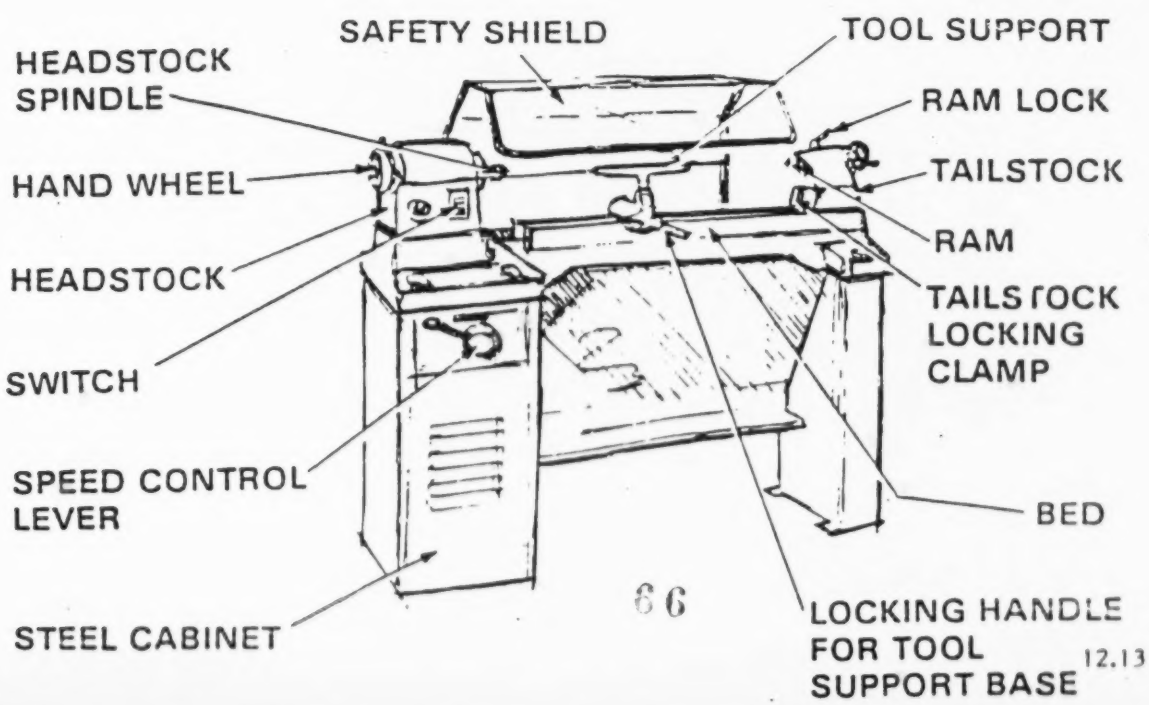
SAFETY QUIZ *(Circle True or False)*

1. *There is no real minimum regarding thickness or length of stock which can be planed safely.*	T	F
2. *Stock should be pulled through the planer by hand.*	T	F
3. *You should never look into the throat area at table level.*	T	F
4. *The power should be turned off while removing chips or shavings.*	T	F
5. *A jig or other support is often needed for thin stock.*	T	F
6. *The proper depth of cut and rate of speed is related to the material being planed.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: **WOOD LATHE**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating.*
4. *Always use proper eye protection.*
5. *Work must be balanced and securely held between centers or mounted on a face plate.*
6. *Rotate spindle by hand to check clearance before starting the lathe.*
7. *Make sure safety shield is lowered.*
8. *Tool rest must be 1/8" from the work piece and adjusted to the proper height for the tool being used.*
9. *Be sure the lathe is running at the proper speed for the operation.*
10. *Remove the tool rest and base or support before sanding or polishing.*
11. *Make sure lathe cutting tools are sharp and use the correct tool for the operation.*



12.13

WOOD LATHE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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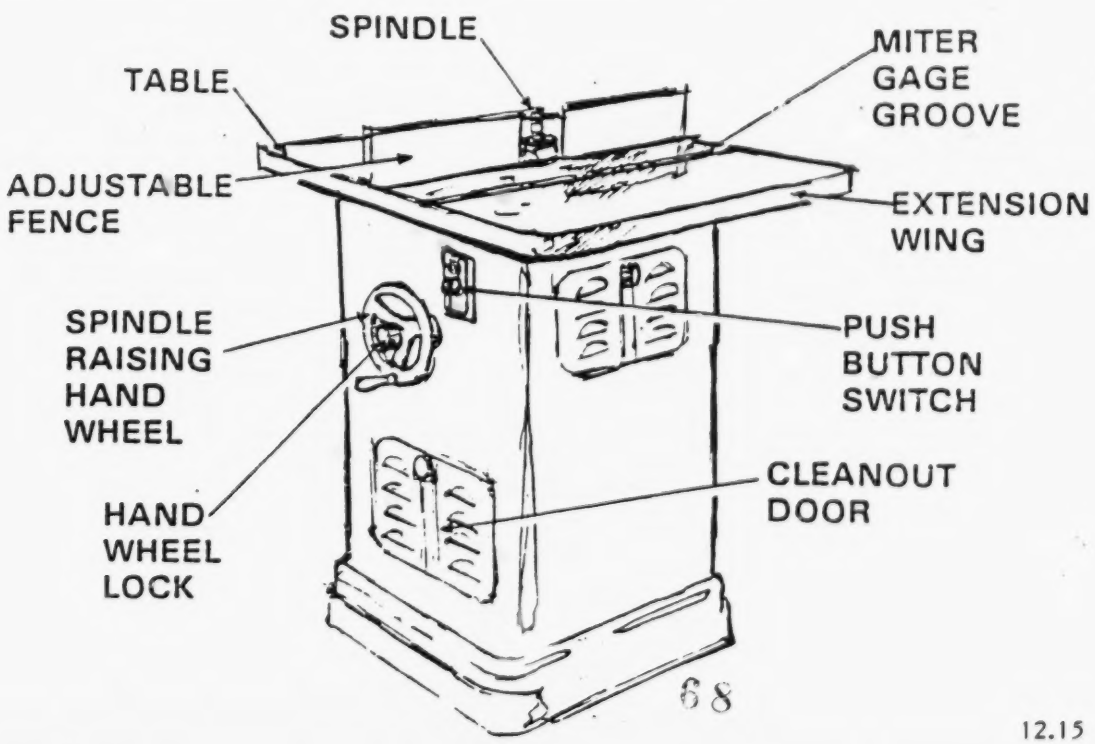
SAFETY QUIZ *(Circle True or False)*

1. *The speed of the machine is not important for safe operation.*	T	F
2. *A space of 1" is safe between the tool rest and the work.*	T	F
3. *Eye protection is not necessary during operation.*	T	F
4. *Dull tools may be used for a roughing operation.*	T	F
5. *The tool rest should be removed while sanding.*	T	F
6. *It is safe to turn work that is not balanced.*	T	F
7. *Long sleeves may be worn while operating the lathe.*	T	F
8. *The cutting tools should be held loosely.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***WOOD SHAPER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating.*
4. *Always use proper eye protection.*
5. *All adjustments for cutter height and fence position should be made with the power off.*
6. *Guards and hold downs should be checked for proper operation.*
7. *Choose the correct cutter and collars for the operation.*
8. *Expose only the amount of cutter necessary to do the job. Use additional fixtures if necessary.*
9. *Always use a starting pin for free hand shaping.*
10. *Use the smallest table insert possible.*
11. *Use three wing-one piece cutters when ever possible.*
12. *Brush away dust and chips only when the machine is stopped.*



12.15

WOOD SHAPER

Student Name _____

Class _____

Date _____ *Grade* _____

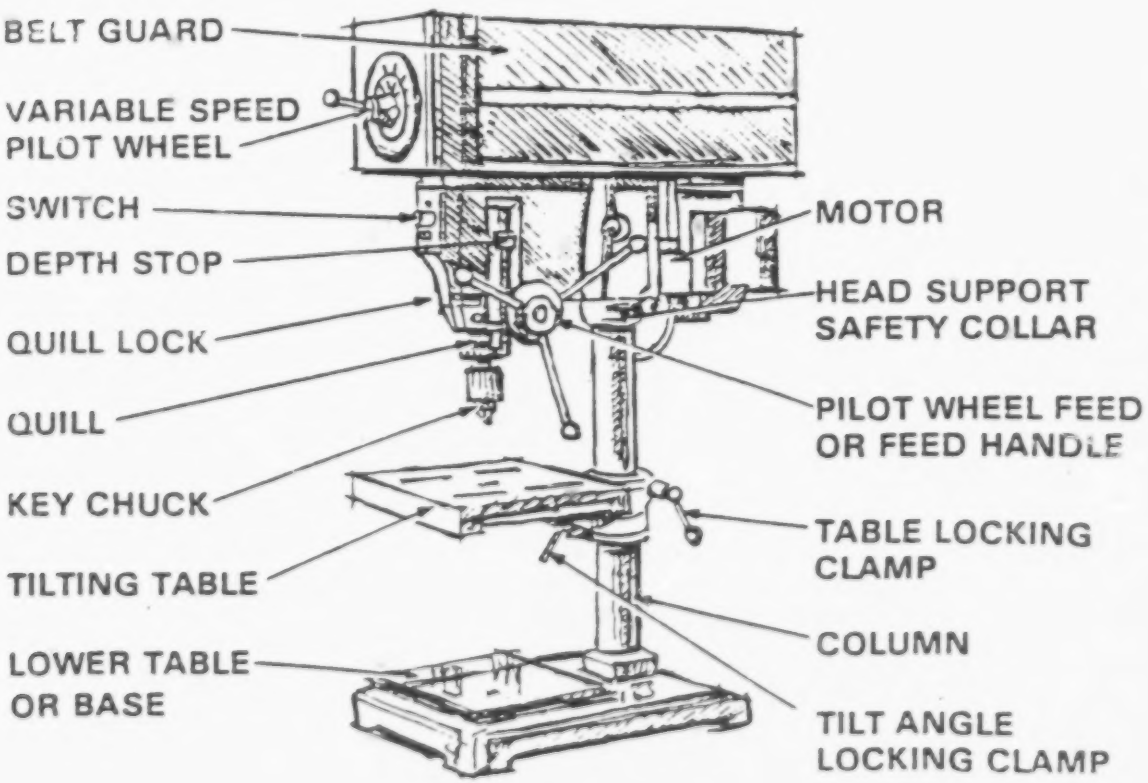
Instructor's Name _____

SAFETY QUIZ *(Circle True or False)*

1. *In most cases guards and hold downs only get in the way.*	T	F
2. *Often special or custom jigs and/or fixtures must be made to do a job safely.*	T	F
3. *A starting pin is not necessary.*	T	F
4. *The largest table insert should always be used.*	T	F
5. *A brush should be used to brush away chips when the machine is running.*	T	F
6. *Three wing cutters are safer than a cutter head.*	T	F

Safety Tips: **DRILL PRESS**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Hold material securely with vise or clamps.*
6. *Be sure key is removed from chuck.*
7. *Select a properly sharpened bit. For metal, center punch when hole is to be drilled.*
8. *Turn off power if work piece is caught in the drill. Do not stop by hand.*
9. *Adjust table or depth stop to avoid drilling into the table.*
10. *Select the correct speed, normally slower for metal - faster for wood. The larger the bit, the slower the speed.*



12.17

DRILL PRESS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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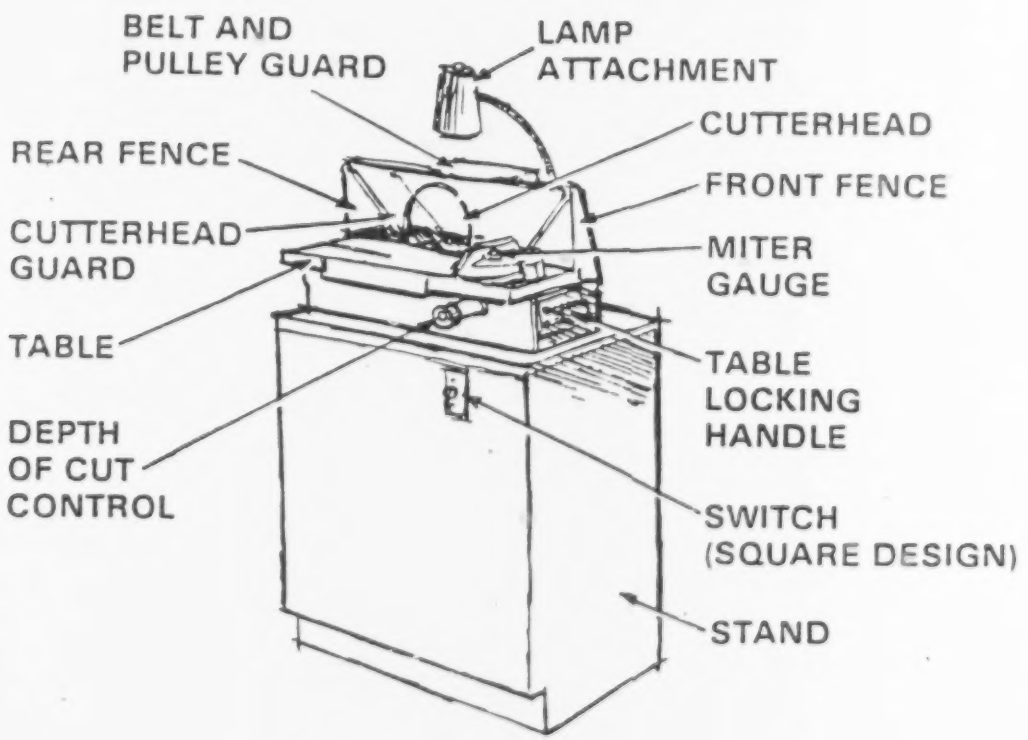
SAFETY QUIZ *(Circle True or False)*

1. *It is necessary to select the proper speed.*	T	F
2. *The chuck key should be kept in the chuck at all times.*	T	F
3. *Work should always be secured.*	T	F
4. *Rings may be worn while operating a drill press.*	T	F
5. *A chip brush should be used for removing chips.*	T	F
6. *The drill should be operated at top speed for all work.*	T	F
7. *The long end of the work should be to the left of the operator.*	T	F

Safety Tips: ***UNIPLANE***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating.*
4. *Always use proper eye protection.*
5. *Be sure switch is in "off" position before adjusting depth of cut, table tilt, or checking cutters.*
6. *The guard must be clean and slide freely before beginning the operation. Do not clamp in the up position.*
7. *Always use push stick or a push block when planing small material.*
8. *Continue moving the work piece past the cutterhead until it is resting against the rear fence.*
9. *Do not brush chips or dust away from the point of operation until the machine has come to a full stop.*



UNIPLANE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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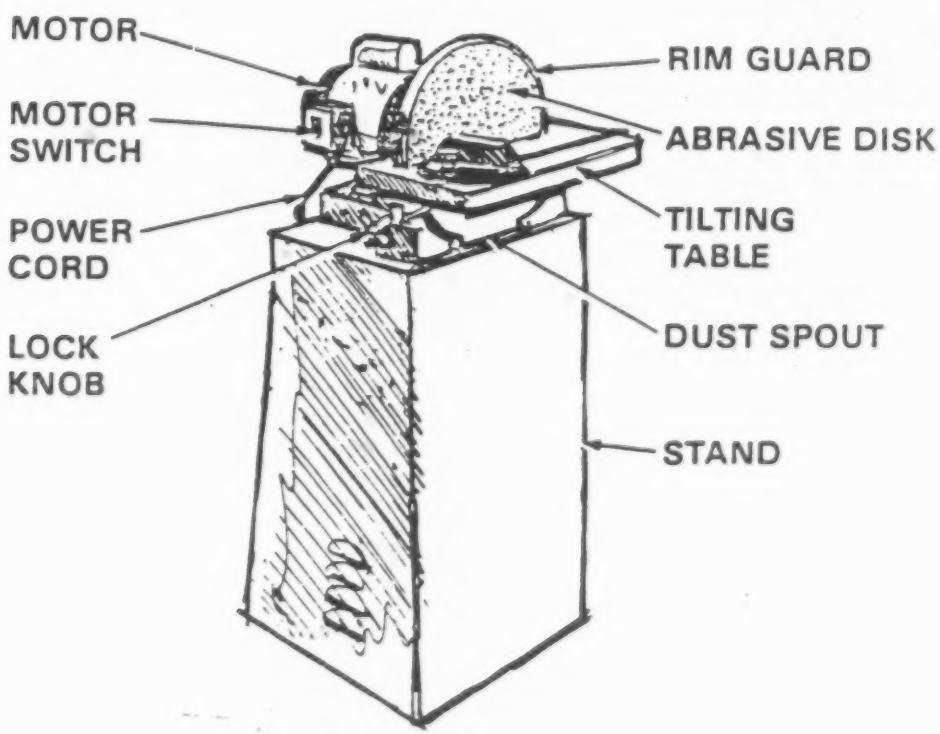
SAFETY QUIZ *(Circle True or False)*

1. *The guard should be clamped in position to clear the work piece.*	T	F
2. *Loose cutters will give a rough cut but are not detrimental to safety.*	T	F
3. *The work piece should be moved through the machine to the rear fence before moving.*	T	F
4. *The machine must come to a full stop before it is safe to leave the work area.*	T	F
5 *All adjustments should be made with the power off.*	T	F
6. *A lamp attachment contributes to safety.*	T	F

Safety Tips: **DISC SANDER**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make sure adhesive is holding abrasive disc tightly to the revolving platen.*
6. *Abrasive disc should not be torn or damaged.*
7. *Material should be held flat against the table and hands kept clear of the abrasive disc.*
8. *The table should be adjusted to within 1/16" of the disc.*
9. *Work must be done on the side of the disc rotating downward.*
10. *Do not leave this machine until it has coasted to a full stop or been stopped with a piece of scrap wood.*



DISC SANDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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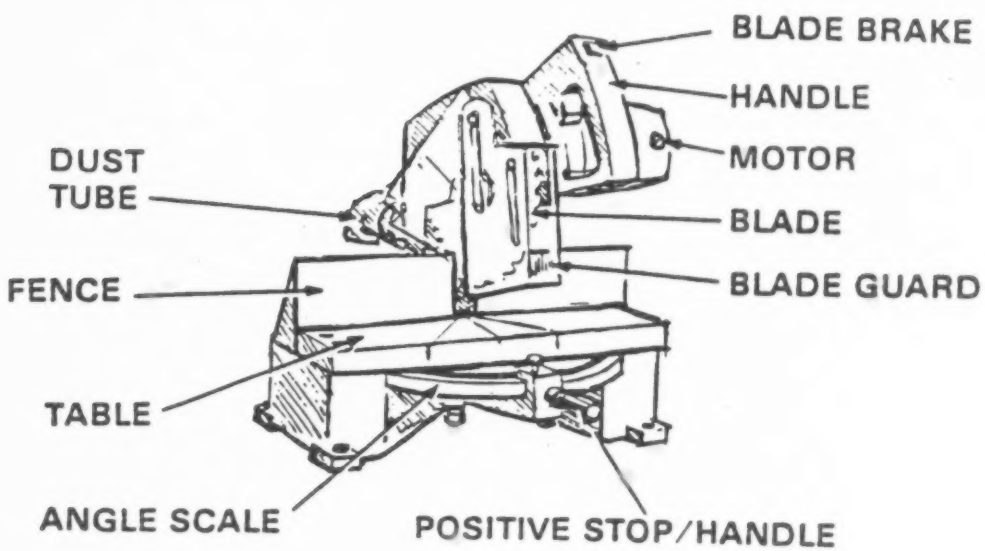
SAFETY QUIZ *(Circle True or False)*

1. *Sanding can be safely done on either the left or right side of the rotating disc.*	T	F
2. *The Rim Guard is of no real value and can be removed for most operations.*	T	F
3. *The table should be adjusted to within 1/16" of the disc.*	T	F
4. *A piece of scrap lumber can be used to slow down and stop the disc after turning off the power.*	T	F
5. *The table may be tilted safely while the machine is running.*	T	F

Safety Tips: ***MOTORIZED MITER BOX***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure power is disconnected before making angle adjustments or changing blades.*
6. *Always hold the work firmly against the fence and table.*
7. *Install a new table if adequate support has been cut away.*
8. *Allow the motor to reach full speed before starting to cut.*
9. *Use the brake to stop the blade before removing scrap or chips from the work area.*
10. *Be sure guard parts are functioning properly.*



MOTORIZED MITER BOX

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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SAFETY QUIZ *(Circle True or False)*

1. *The table on this machine can be cut so often that it no longer gives safe support to the work.* T F

2. *The machine should be stopped by pushing a piece of scrap against the side of the the blade.* T F

3. *The guard sections can easily be checked for proper operation before starting to use the machine.* T F

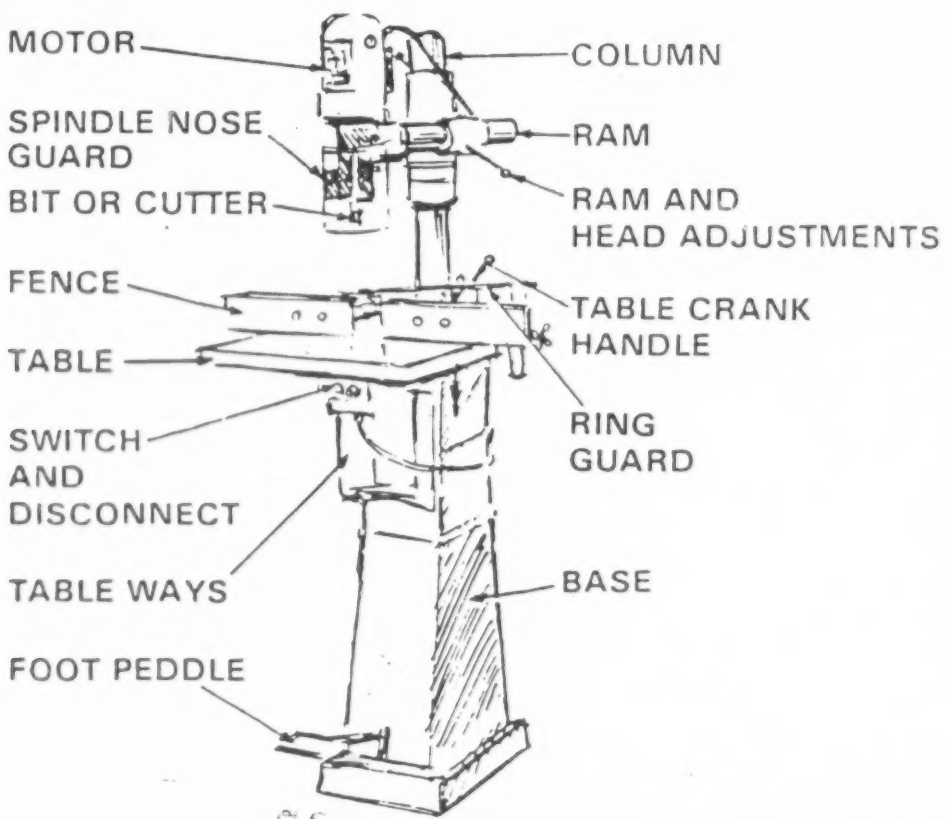
4. *The trigger switch and the brake button can be used together to gain better control.* T F

5. *A warped or twisted work piece is not really dangerous.* T F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***OVERARM ROUTER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make all adjustments to the table, fence, overarm and spindle with the power turned off.*
6. *Disconnect from power source when changing cutters or bits.*
7. *Check set up carefully before starting operation to be sure cuttler clears the table, fence and any fixtures.*
8. *Be sure guard is in place before starting cut.*
9. *Feed material against the direction of rotation whenever possible.*
10. *When pin routing make sure pin or table insert is tight and the work piece is secure in the jig.*



OVERARM ROUTER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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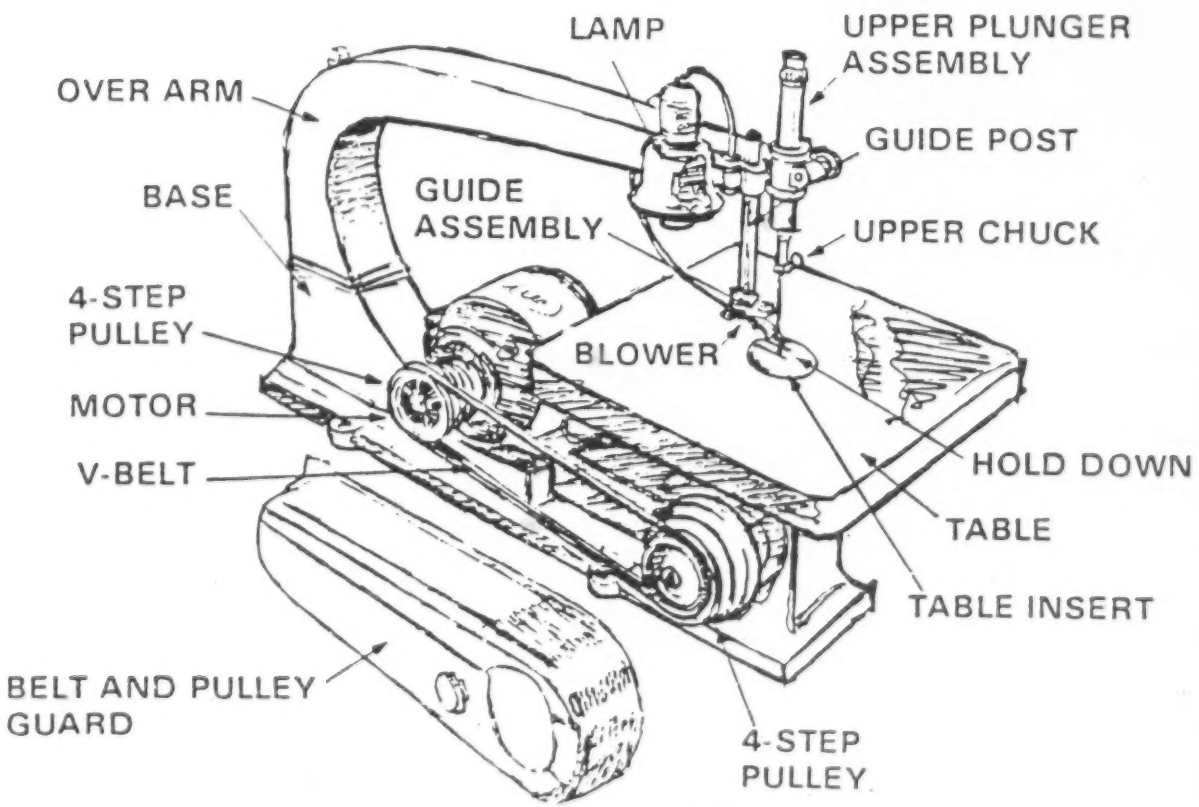
SAFETY QUIZ *(Circle True or False)*

1. *When shaping or routing, a jogging motion will give a smoother cut.*	T	F
2. *Special or custom jigs or fixtures are necessary for some operations.*	T	F
3. *The machine must be disconnected from the power source when changing bits.*	T	F
4. *The speed of this machine is about 5 thousand RPM.*	T	F
5. *Both hands should be used to move or control the work piece.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***SCROLL SAW***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make all adjustments with the power off the rotate the motor by hand as a final check.*
6. *Be sure hold down is pressing lightly on the work piece.*
7. *The blade should be held firmly in the chucks, be square with the table, and be properly supported by the guide assembly.*
8. *Guide the material slowly through the machine with both hands, keeping fingers away from the cut line.*
9. *Choose the correct blade and correct speed for the material to be cut, and for the smallest radius required.*



12.27

SCROLL SAW

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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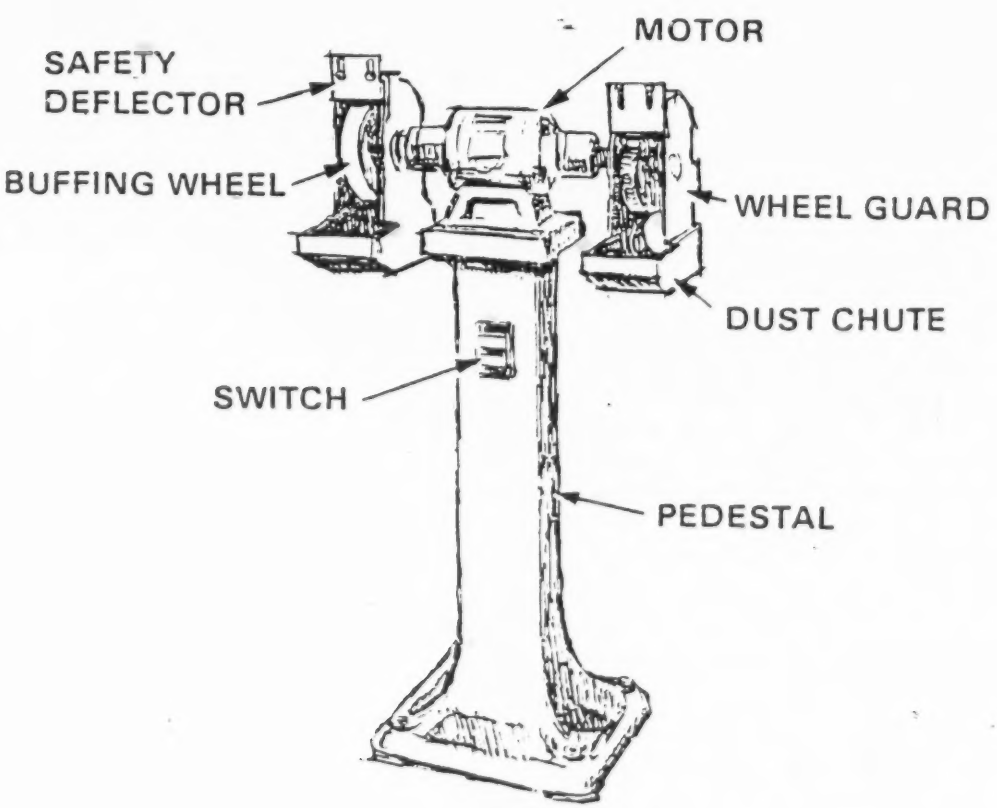
SAFETY QUIZ *(Circle True or False)*

1. *If the blade pinches in the kerf, you should just push harder.*	T	F
2. *It is necessary to have the flat side of the stock tight against the table.*	T	F
3. *Fingers should be kept away from the cutting line.*	T	F
4. *The hold down should be 1/16" from the work piece*	T	F
5. *After changing blades or making guide adjustments, the machine should be rotated one full stroke by hand.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***BUFFER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Always buff using the lower half of the buffing wheel.*
6. *Stand to one side of the wheel when buffing or applying compound.*
7. *Use care when buffing around corners or openings where the wheel could grab and throw the work piece.*
8. *Never use gloves, rags or part of a shop coat to hold the work piece.*
9. *Never buff a leading edge.*



BUFFER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

SAFETY QUIZ *(Circle True or False)*

1. *A rag should be used to hold hot objects while buffing.*	T	F
2. *Always buff on the lower half of the wheel.*	T	F
3. *Loose clothing or hair must be confined.*	T	F
4. *Eye protection must be worn when buffing.*	T	F
5. *Use extra caution when buffing corners or confined areas of the work.*	T	F

Safety Tips:

POWER HACKSAW

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *All adjustments to the chip removal brushes, blade tension, guides, vice or drive system should be done with the power off.*
6. *Be sure blade guides are properly adjusted to both the blade and the work size or vise before starting cut.*
7. *Adjust feed rate so blade does not bounce or plunge into work when starting the cut.*
8. *Be sure work is tightly clamped in the vise and properly positioned for an efficient safe cut.*
9. *Keep hands away from cutting area and brush away chips only when the machine is turned off.*
10. *If the material requires coolant be sure the system is working and the correct coolant is used.*

NOTE: *Same As Horizontal Band Saw*
(See Page 12.33)

POWER HACK SAW

Student Name _____

Class _____

Date _____ *Grade* _____

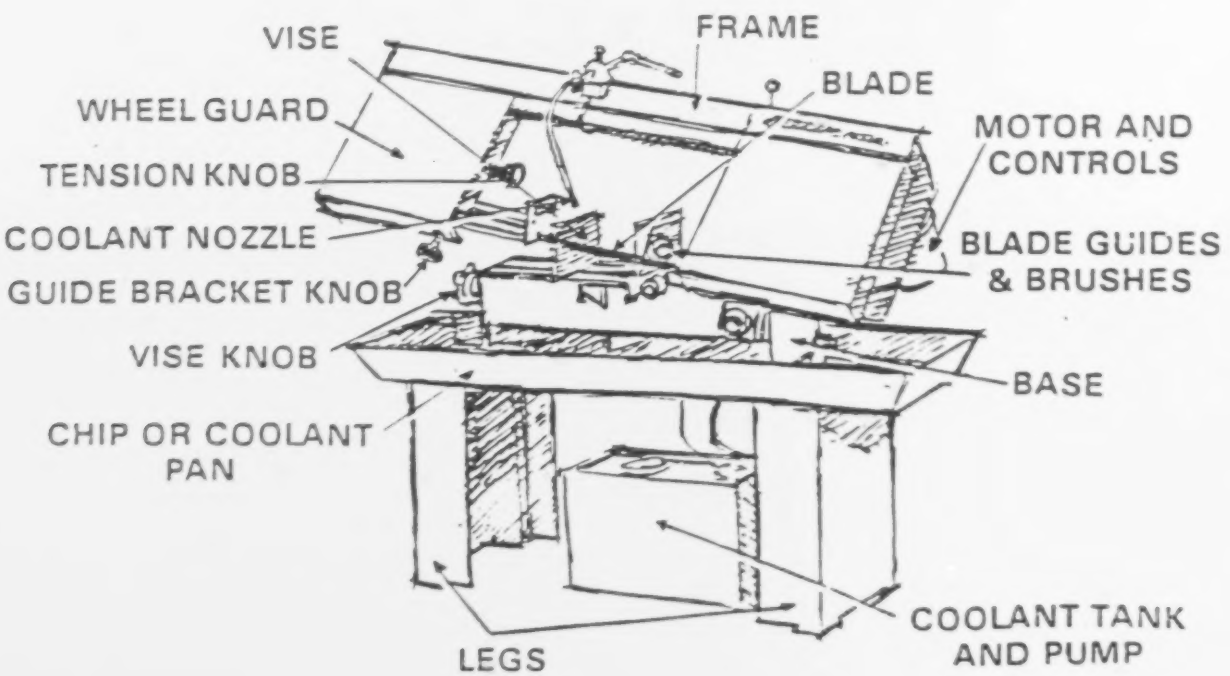
Instructor's Name _____

SAFETY QUIZ *(Circle True or False)*

1. *Chips or dirt in the vise may cause inaccuracy but does not affect safety.*	T	F
2. *It is safe to apply slight pressure to the saw frame to increase the speed of the cutting action.*	T	F
3. *Blade guides should be adjusted to the blade and to the size of the work piece or vise.*	T	F
4. *Chips should be removed only when the machine is stopped.*	T	F
5. *If the cut is not straight, the problem is probably with the material.*	T	F
6. *The work piece must be properly positioned in the vise, in addition to just being held securely.*	T	F

Safety Tips: **HORIZONTAL BAND SAW**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *All adjustments to the chip removal brushes, blade tension, guides, vice or drive system should be done with the power off.*
6. *Be sure blade guides are properly adjusted to both the blade and the work size or vise before starting cut.*
7. *Adjust feed rate so blade does not bounce or plunge into work when starting the cut.*
8. *Be sure work is tightly clamped in the vise and properly positioned for an efficient safe cut.*
9. *Keep hands away from cutting area and brush away chips only when the machine is turned off.*
10. *If the material requires coolant be sure the system is working and the correct coolant is used.*



HORIZONTAL BAND SAW

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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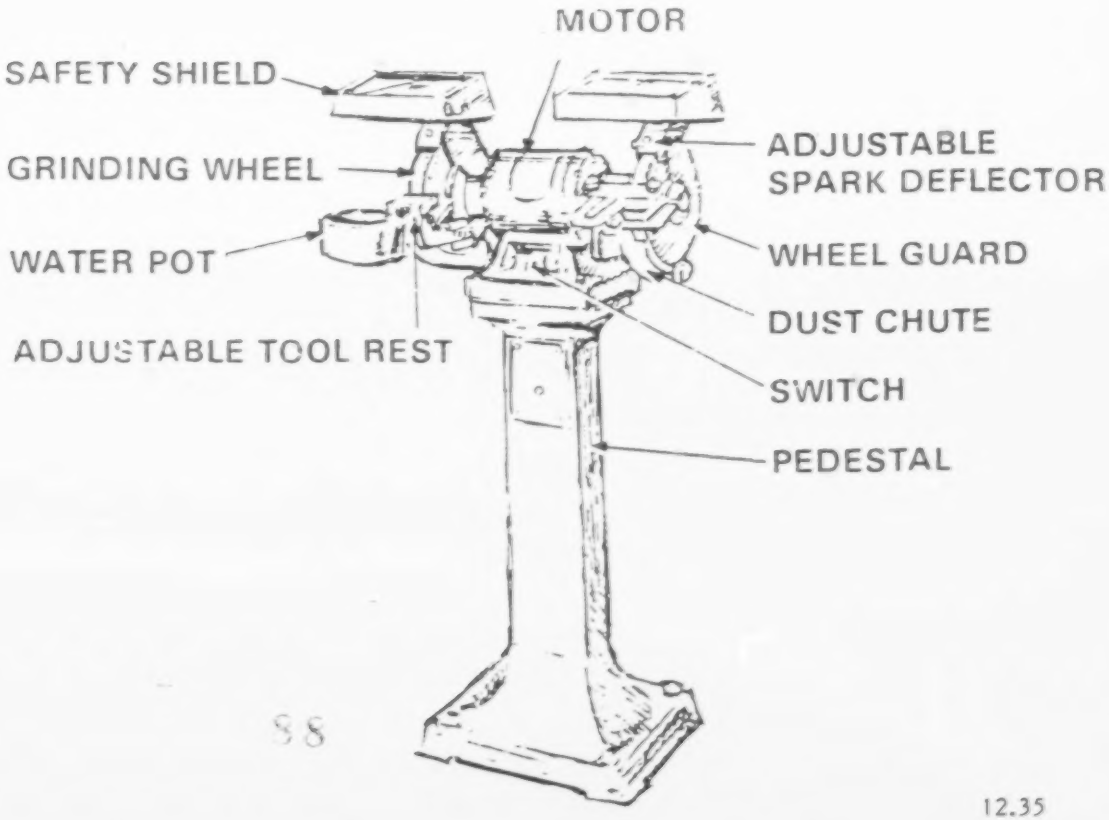
SAFETY QUIZ *(Circle True or False)*

1. *Chips or dirt in the vise may cause inaccuracy but does not affect safety.*	T	F
2. *It is safe to apply slight pressure to the saw frame to increase the speed of the cutting action.*	T	F
3. *Blade guides should be adjusted to the blade and to the size of the work piece or vise.*	T	F
4. *Chips should be removed only when the machine is stopped.*	T	F
5. *If the cut is not straight, the problem is probably with the material.*	T	F
6. *The work piece must be properly positioned in the vise, in addition to just being held securely.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***PEDESTAL - GRINDER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *The tool rests must be adjusted to within 1/16" of the grinding wheel.*
6. *Spark deflectors must be adjusted to within 1/16" of the grinding wheel.*
7. *Do not grind on the side of the grinding wheels.*
8. *Stand to one side when starting the machine.*
9. *Discard or report grinding wheels that are excessively small or cracked.*
10. *Small work pieces should be held with "vise grip" type pliers.*
11. *Do not leave the machine until the grinding wheels have come to a full stop.*
12. *Base should be secured before any operation takes place.*



PEDESTAL - GRINDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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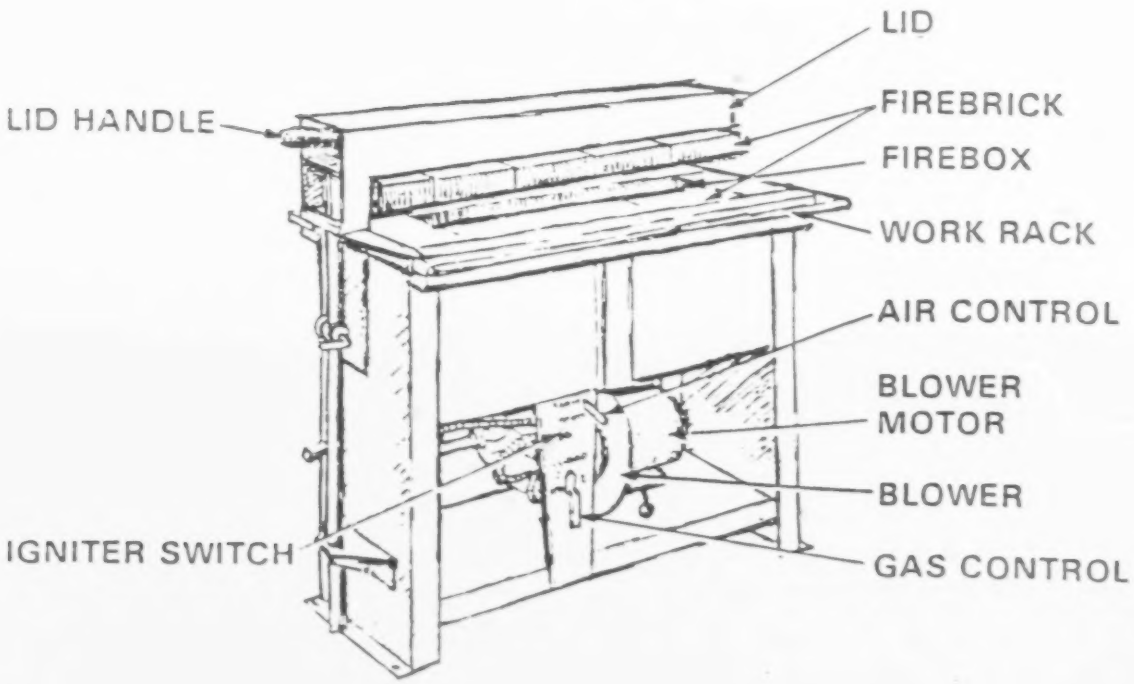
SAFETY QUIZ *(Circle True or False)*

1. *The tool rest should be adjusted to within 1/2" of the wheel.*	T	F
2. *Eye protection is always necessary while grinding.*	T	F
3. *Once the "off" switch is in the off position, the operator may leave.*	T	F
4. *Wheels that are slightly cracked may be used.*	T	F
5. *The spark arrestor is not necessary if there is a safety shield.*	T	F
6. *When grinding a small piece of steel, "vise grips" are advised.*	T	F

Safety Tips: **GAS FORGE**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *The top must be open when lighting the forge.*
6. *Sequence directions for igniting air and gas must be followed exactly.*
7. *Asbestos gloves must be worn when tongs are not used.*
8. *Hot metal left unattended must be marked "HOT" with chalk.*
9. *When shutting down, turn gas off first.*



GAS FORGE

Student Name _____

Class _____

Date _____ *Grade* _____

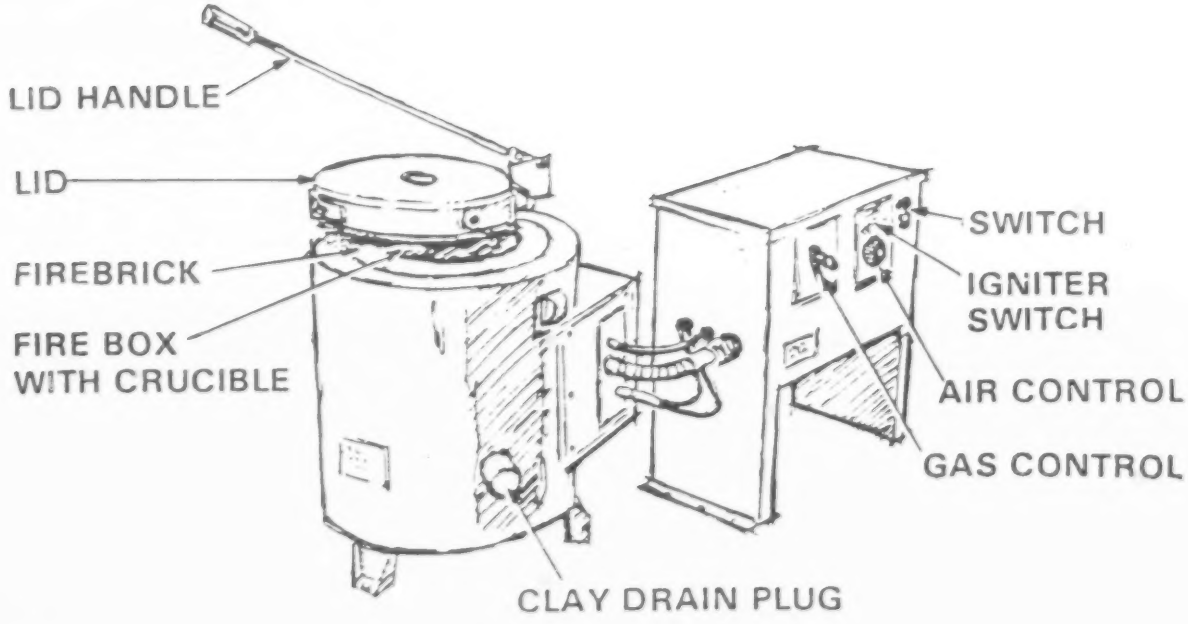
Instructor's Name _____

SAFETY QUIZ *(Circle True or False)*

1. *Tongs should be available for the handling of hot metal.*	T	F
2. *Gloves should be worn when handling the tongs.*	T	F
3. *The top slot should be closed when lighting the forge.*	T	F
4. *The air should be turned off first when shutting down.*	T	F
5. *Hot metal should be marked "HOT".*	T	F

Safety Tips: ***CRUCIBLE FURNACE***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Protective clothing must be worn - coat, gloves, face shield, shoes, leg protectors.*
6. *Do not throw metal in crucible, use tongs.*
7. *When pouring, keep metal close to the floor and move slowly.*
8. *Do not step on metal spilled on the floor.*
9. *Be sure to pin crucible in pouring cradle.*



CRUCIBLE FURNACE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

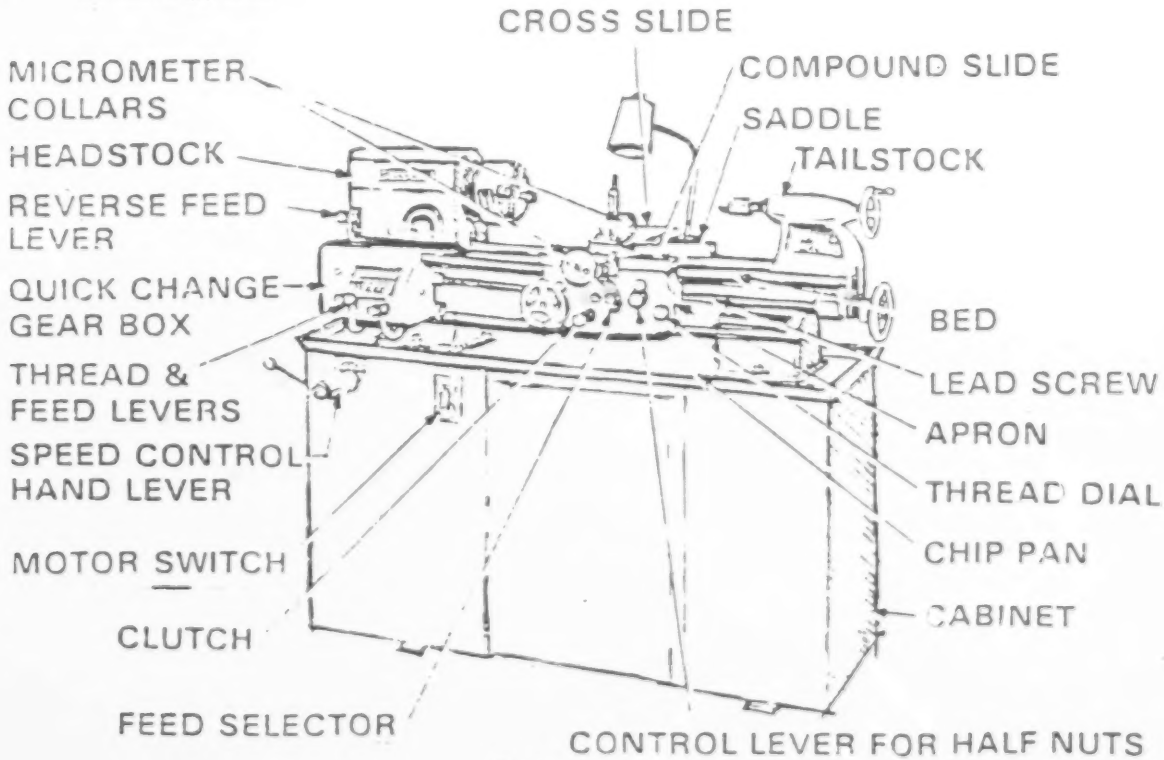
SAFETY QUIZ *(Circle True or False)*

1. *Metal accidentally spilled on the floor should be kicked aside.*	T	F
2. *When pouring, you should move as quickly as possible.*	T	F
3. *Protective clothing is necessary when charging the crucible.*	T	F
4. *Metal should not be thrown or dropped into crucible. Tongs should always be used.*	T	F
5. *If goggles are used, a face shield is not necessary.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***METAL LATHE***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Never leave the chuck key in the lathe chuck.*
6. *Rotate spindle by hand to check clearance before engaging power.*
7. *Remove chips with a brush, never by hand.*
8. *Make sure work is secure and lathe is set at correct speed and feed before starting cut.*
9. *Handle chucks and face plates carefully. Never adjust tool bit when tool holder is hand held.*
10. *Remove tool holder and tool post before filing or polishing.*
11. *Do not hand stop a lathe chuck, allow it to coast to a stop. Keep hands away from all moving parts.*



12.41

METAL LATHE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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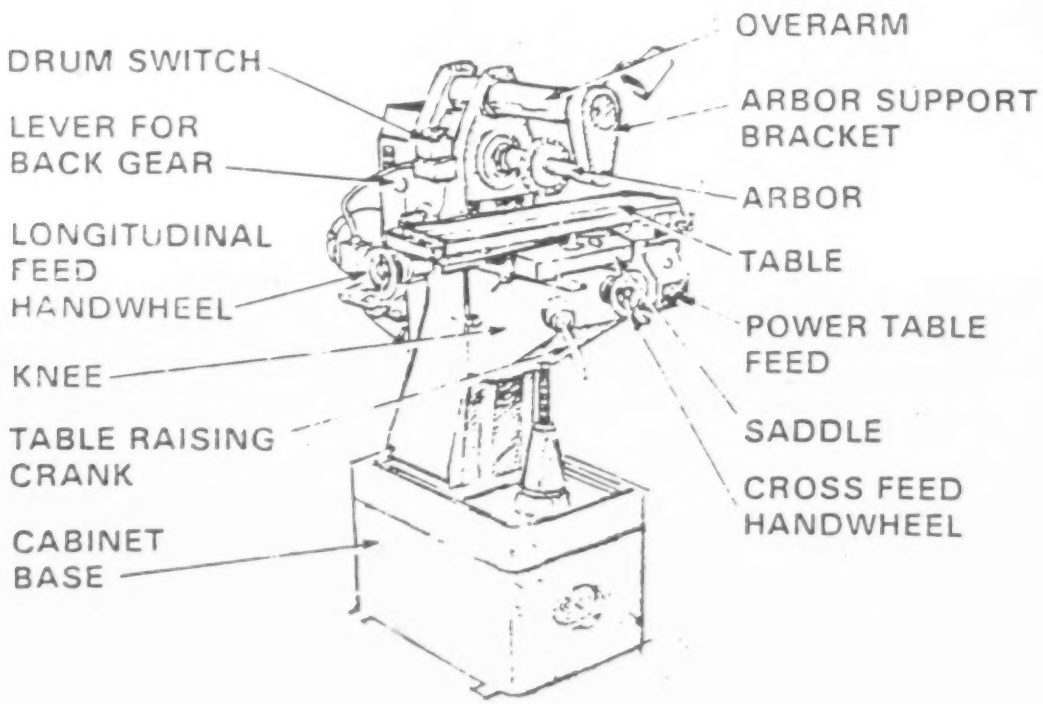
SAFETY QUIZ *(Circle True or False)*

1. *A brush should be used for removing chips.*	T	F
2. *The tail stock need not be secured to the bed.*	T	F
3. *The chuck wrench remains in the chuck when the machine is stopped.*	T	F
4. *It is safe to turn machine by hand before starting.*	T	F
5. *Measurements should be made while the machine is stopped.*	T	F
6. *The tool bit should be adjusted only when the tool holder is locked in the tool post.*	T	F

Safety Tips: **HORIZONTAL MILLING MACHINE**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating.*
4. *Always use proper eye protection.*
5. *Make all adjustments with the power off.*
6. *Be sure cutter is tightly held in arbor or collet and material is securely held by a vise, clamps, or magnetic chuck.*
7. *Do not climb cu without specific permission.*
8. *Check depth and width of cut, cutter rotation, plus speed of cutter and power feed before starting the machine.*
9. *Never clear chips away while machine is in operation. Keep hands away from chips and the point of operation.*
10. *Remain with the machine for the duration of the cut.*



HORIZONTAL MILLING MACHINE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

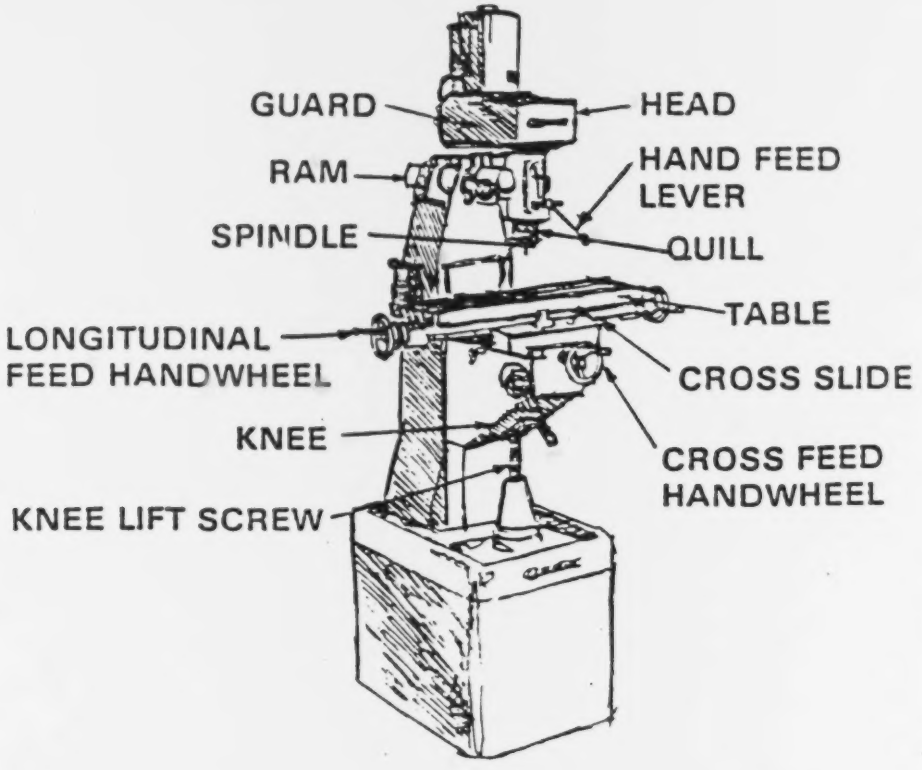
SAFETY QUIZ *(Circle True or False)*

1. *Small chips can be safely wiped away by hand if the machine is stopped.*	T	F
2. *While on automatic or power feed it is permissible to leave the machine.*	T	F
3. *Permission must be obtained to climb cut.*	T	F
4. *Since they are very sharp, cutters should be handled carefully.*	T	F
5. *All adjustments must be made or checked with the power off.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: *VERTICAL MILLING MACHINE*

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make all adjustments with the power off.*
6. *Be sure cutter is tightly held in the collet and material is securely held by a vise, clamps, or magnetic chuck.*
7. *Check spindle rotation, speed, depth of cut and all power feed adjustments before starting the cut.*
8. *Keep hands away from the cutter. Remove chips with a brush after the machine is turned off.*
9. *Once a cutting pass is made do not back out or return to the starting position without proper clearance.*
10. *Remain with the machine for the duration of the cut.*



VERTICAL MILLING MACHINE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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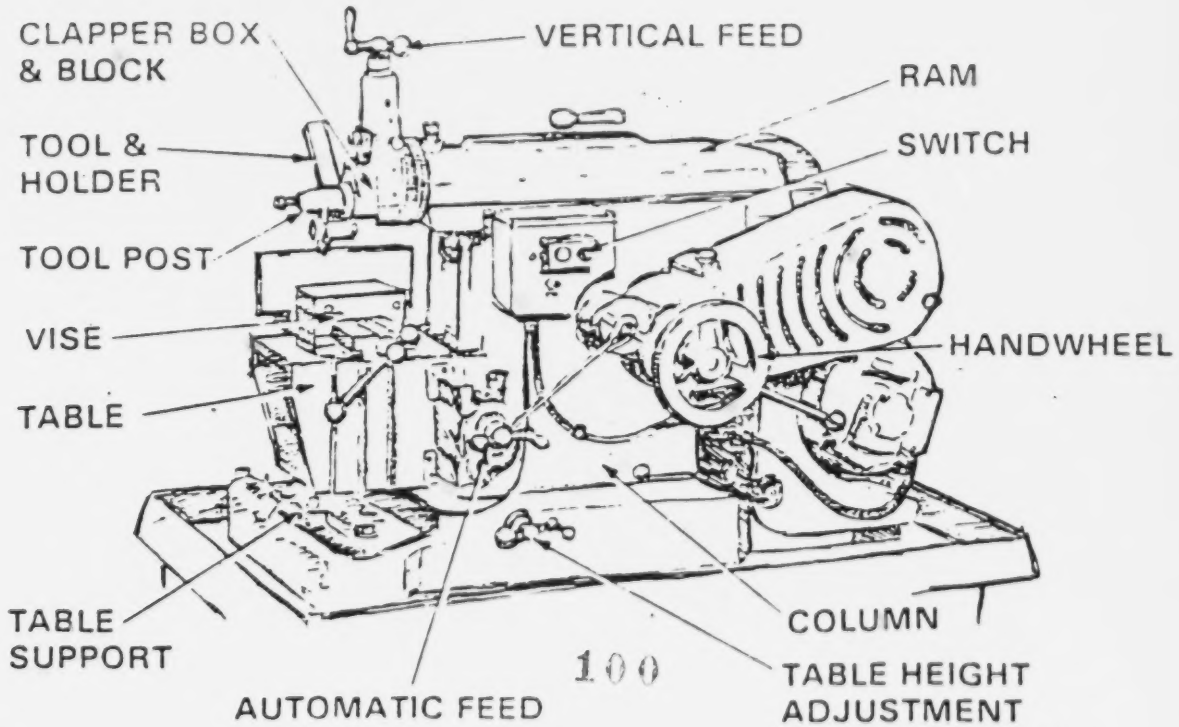
SAFETY QUIZ *(Circle True or False)*

1. *If a brush is used, it is safe to remove chip while the machine is running.*	T	F
2. *All adjustments have to be made with the power turned off.*	T	F
3. *If machine is running slow, eye protection is not necessary.*	T	F
4. *You can back out of a cut at any time without raising the quill or moving the table.*	T	F
5 *The work piece must be securely fastened to the table before beginning the cut.*	T	F

Safety Tips: **<u>METAL SHAPER</u>**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make adjustments while the machine is stopped and run through one cycle by hand as a check for clearance.*
6. *Make sure all guards are secure before starting the machine.*
7. *Be sure the work piece is securely held in the vise or holding device.*
8. *Avoid standing directly in front of the ram.*
9. *Keep hands away from the work point or possible pinch point of the shaper.*
10. *Do not lay tools or tooling on any part of the machine.*
11. *Never remove chips while the machine is in motion.*
12. *Before leaving make sure the shaper comes to a full stop.*



12.47

METAL SHAPER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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SAFETY QUIZ *(Circle True or False)*

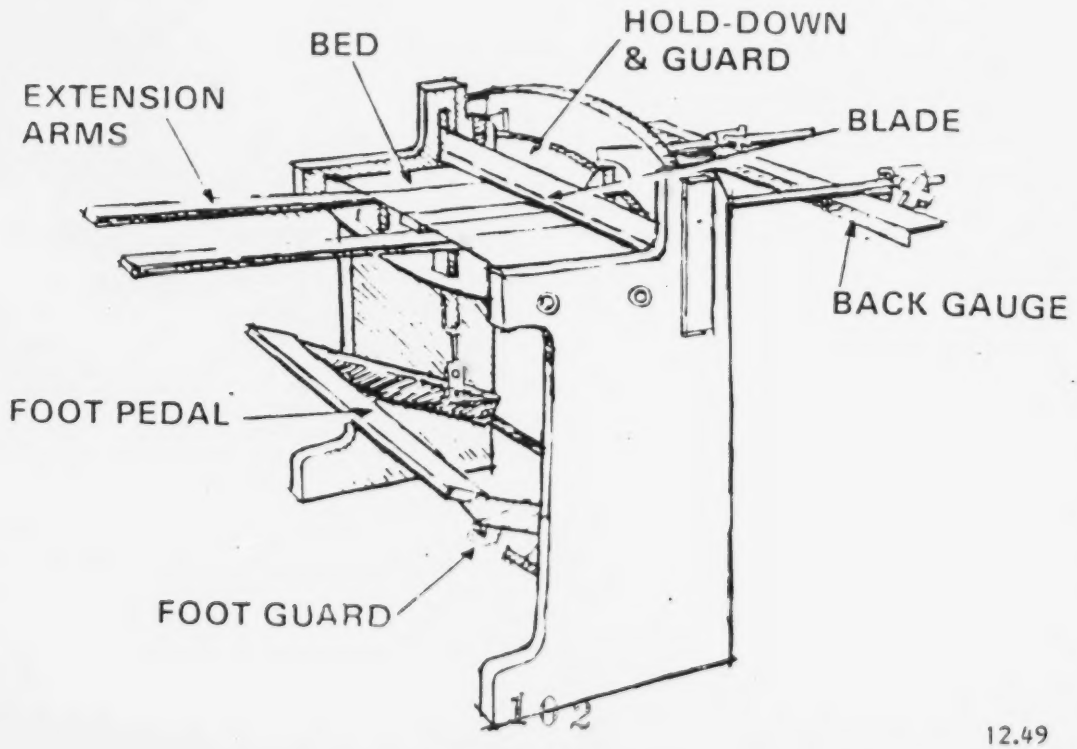
1. *It is permissible to stand in front of the machine while it is running.*	T	F
2. *Eye protection must be worn.*	T	F
3. *A heavy cut may get the job done more quickly but also could be unsafe.*	T	F
4. *Chips may be quickly removed while the machine is running.*	T	F
5. *All clearances should be checked before the ram is set in motion.*	T	F
6. *All set-ups should be approved by your instructor.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips:

SQUARING SHEARS

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Check the machine and the setup before operating. If needed, get a helper.*
6. *Never exceed the capacity of the machine.*
7. *Use gloves when handling large pieces of sheet metal, and remove obvious burrs from all pieces.*
8. *Keep fingers at least 3" away from pressure bar - hold-down guard - and blade.*
9. *Do not attempt to catch small pieces, allow them to fall to the floor.*
10. *Operate only from the front of the machine.*
11. *Keep area under and around the machine clean nd feet out from under the foot pedal.*



12.49

SQUARING SHEARS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

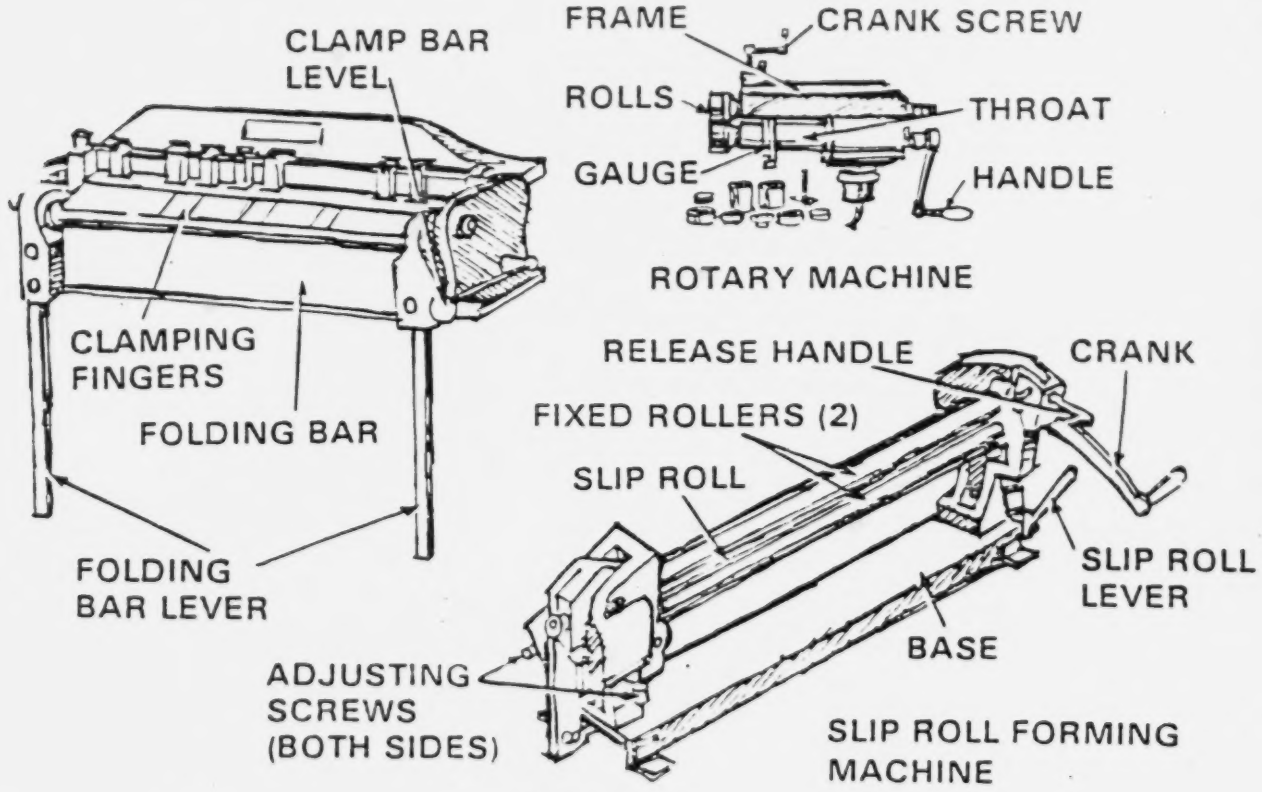
====================*==========*==========*==========*

SAFETY QUIZ *(Circle True or False)*

1. *Feed and operate from the treadle side of the machine only.*	T	F
2. *It is permissible to let small pieces drop into a box as they are cut.*	T	F
3. *Two students may operate the shear together.*	T	F
4. *For some projects the guard can be removed.*	T	F
5. *Gloves can be worn when operating this machine.*	T	F
6. *Eye protection is not required.*	T	F

Safety Tips: **SHEET METAL MACHINES**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Adjust, change rolls, set stops, and properly check or assemble before operating.*
6. *Never bend, roll, crimp, or bead metal which exceeds the capacity of the machine.*
7. *Work with only one piece of metal at one time, never double thickness or two pieces side by side.*
8. *Remove burrs from the metal before attempting to work it in the machine.*
9. *Keep hands away from clamps, jaws, rolls, and other pinch points.*
10. *Do not force or hit drop-levers or handles.*



SHEET METAL MACHINE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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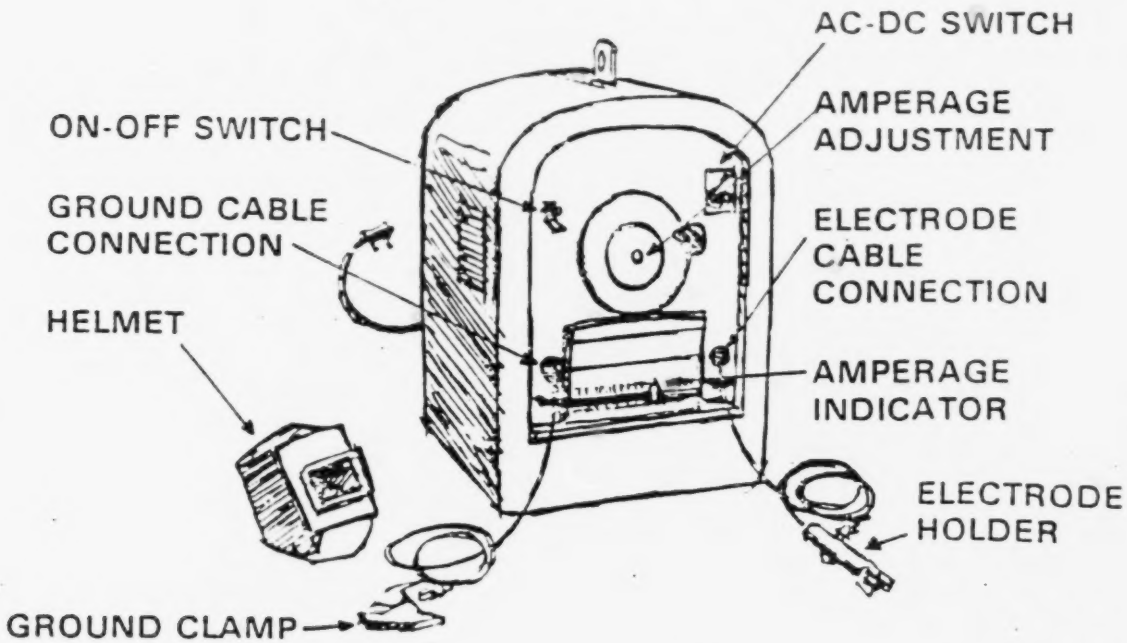
SAFETY QUIZ *(Circle True or False)*

1. *The infeed rolls of a roll machine are dangerous to the operator's hand.*	T	F
2. *Sheet metal machines can be damaged by overloading.*	T	F
3. *Sharp burrs and edges should be removed before attempting to place in the machine.*	T	F
4. *Fingers must be kept clear of moving parts.*	T	F
5. *Quarter inch mild steel stock can be formed on the sheet metal machine.*	T	F
6. *If a handle jams, it can be tapped lightly with a hammer.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***ARC WELDER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *A welding helmet must be worn when welding.*
6. *Proper ventilation must be available.*
7. *Goggles must be worn when chipping slag.*
8. *Others in the area must be warned prior to striking an arc.*
9. *Gloves and proper clothing must be worn when welding.*
10. *Closed containers should not be welded without the instructor's permission.*
11. *Cables, clamps and electrode holder should be checked and working properly.*
12. *Screens to protect others must be in place before welding is started.*



ARC WELDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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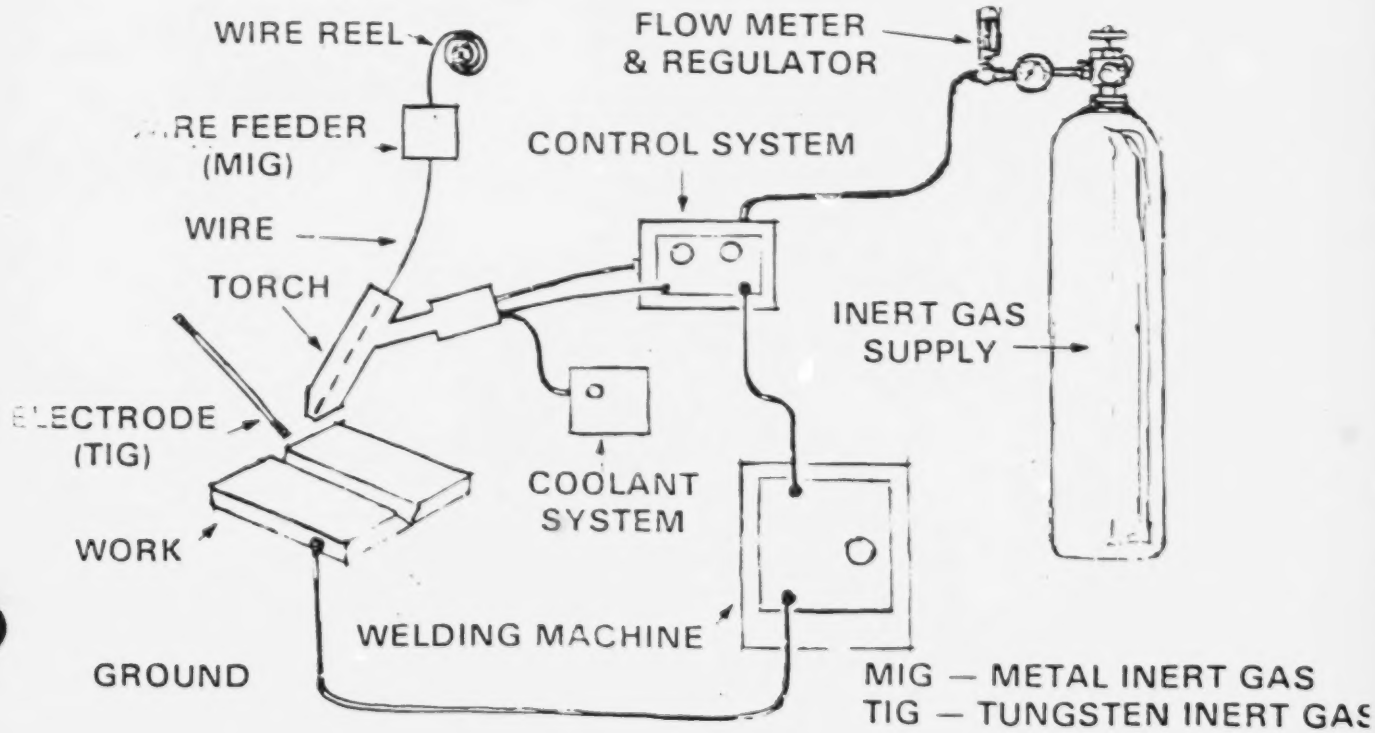
SAFETY QUIZ *(Circle True or False)*

1. *You should warn anyone nearby before you start to weld.*	T	F
2. *Goggles, as well as welding hood, should be available before you start to weld.*	T	F
3. *A closed container is dangerous to weld.*	T	F
4. *Gloves are not necessary when welding.*	T	F
5. *It is dangerous to weld without proper ventilation.*	T	F
6. *An electric shock is possible if both the electrode and ground are contacted.*	T	F

Safety Tips: **TIG & MIG WELDER**

1. Operate only with instructor's permission and after you have received instruction.
2. Remove jewelry, eliminate loose clothing, and confine long hair.
3. Make sure all guards are in place and operating correctly.
4. Always use proper eye protection.
5. Additional protective welding clothing, including a helmet, long-sleeved jacket, and gloves must be worn to prevent burns from ultraviolet and infra-red rays emitted while arc welding.
6. The helmet used for TIG or MIG welding should be equipped with a minimum number twelve density shade.
7. Be certain that the welder equipped with a high frequency stabilizing unit is installed, maintained, and used according to the recommendations of both the manufacturer and the Federal Communication Commission.
8. Never touch the tungsten electrode or MIG wire while the welder is turned on. It is electrically "hot" and can cause a serious shock.
9. Never use the high frequency when performing shield metal arc (stick electrode) welding.



12.55

TIG & MIG WELDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

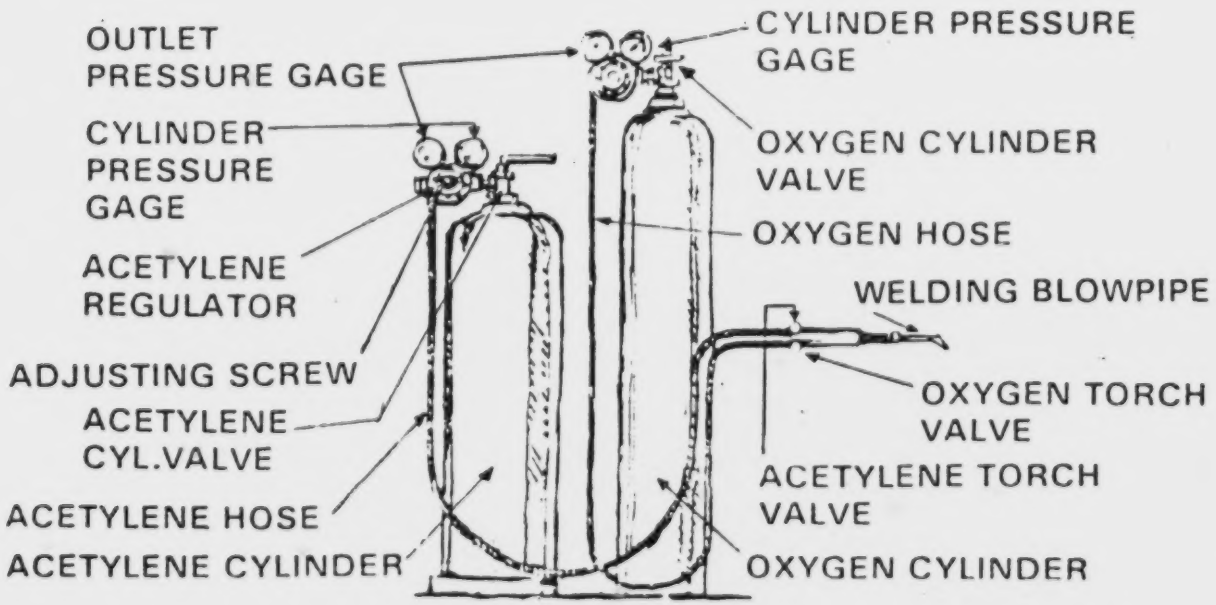
====================*==========*==========*==========*

SAFETY QUIZ *(Circle True or False)*

1. *High frequency welding units are manufactured according to guidelines established by the Federal Communications Commission.*	T	F
2. *It is okay to do TIG or MIG welding without a welding helmet.*	T	F
3. *You can be shocked by touching the Tungsten electrode while the TIG welder is turned on.*	T	F
4. *The high frequency switch must be turned off while performing regular arc welding.*	T	F
5. *Both metal-arc welding and gas shielded arc welding, give off ultra violet and infra-red radiation which can burn unprotected skin.*	T	F

Safety Tips: ***OXY-ACETYLENE WELDER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Do not allow oil to come in contact with hoses or equipment.*
6. *Gas bottles must be erect and secure at all times.*
7. *Keep the cylinder caps on the bottles when not in use.*
8. *Protective goggles and spark-resistant clothing must be worn when welding.*
9. *Confine all cutting and welding to the designated area in the shop.*
10. *Do not weld galvanized metal without proper ventilation.*
11. *Do not weld or cut on a closed container without instructor's approval.*
12. *The acetylene must never exceed 15 psi outlet pressure.*
13. *Turn off torch valves when finished with equipment.*
14. *Turn off gas and oxygen at tanks or stations at the end of class session.*
15. *Back-flow control.*



12.57

OXY-ACETYLENE WELDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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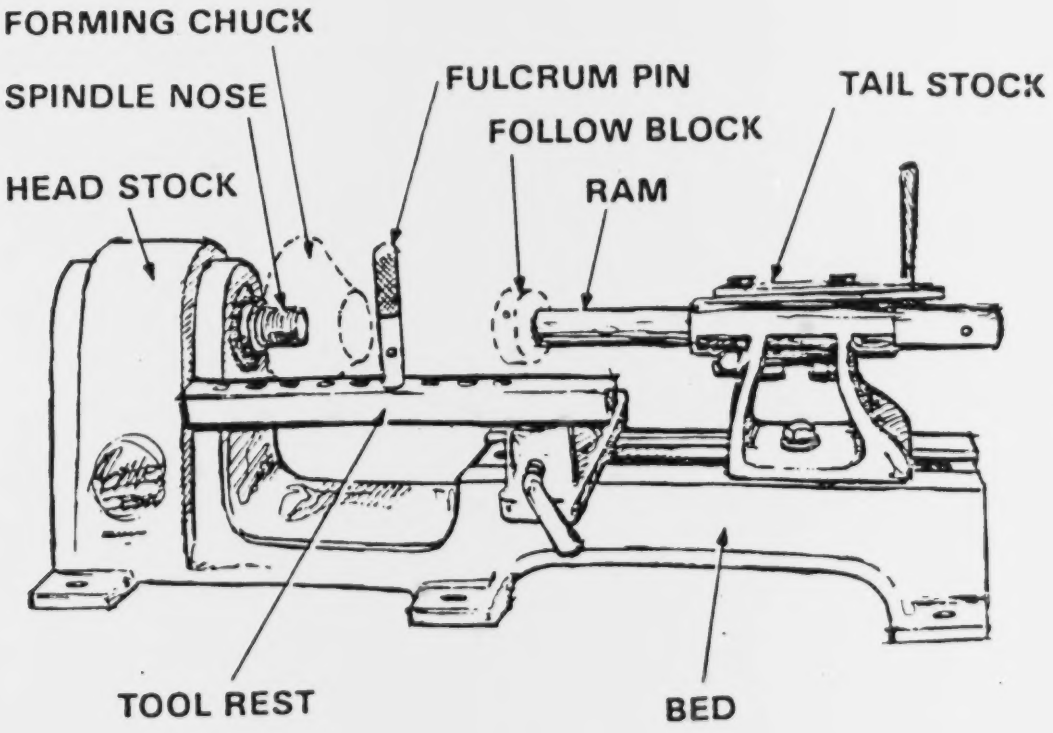
SAFETY QUIZ *(Circle True or False)*

1. *Gas bottles may be laid on the floor when not in use.*	T	F
2. *Closed containers are not hazardous to weld or repair.*	T	F
3. *The cylinder caps should be placed on all bottles when not in use.*	T	F
4. *Eye protection must be worn for all welding, cutting, and chipping operations.*	T	F
5. *The equipment should not be wiped down with oily rags.*	T	F
6. *Acetylene pressure should be set at 20 psi.*	T	F

Safety Tips:

SPINNING LATHE

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure and stand clear of the spindle nose in front of the spinning lathe.*
6. *Do not touch a spinning disc with your hand.*
7. *The tool rest should be no farther than 1" away from the disc.*
8. *Tool rest base, tool rest and fulcrum pin must be tight and secure.*
9. *Use the correct tool for the operation and slowly force material to match the forming chuck.*
10. *Remove tool rest and pin when using steel wool or polishing.*



SPINNING LATHE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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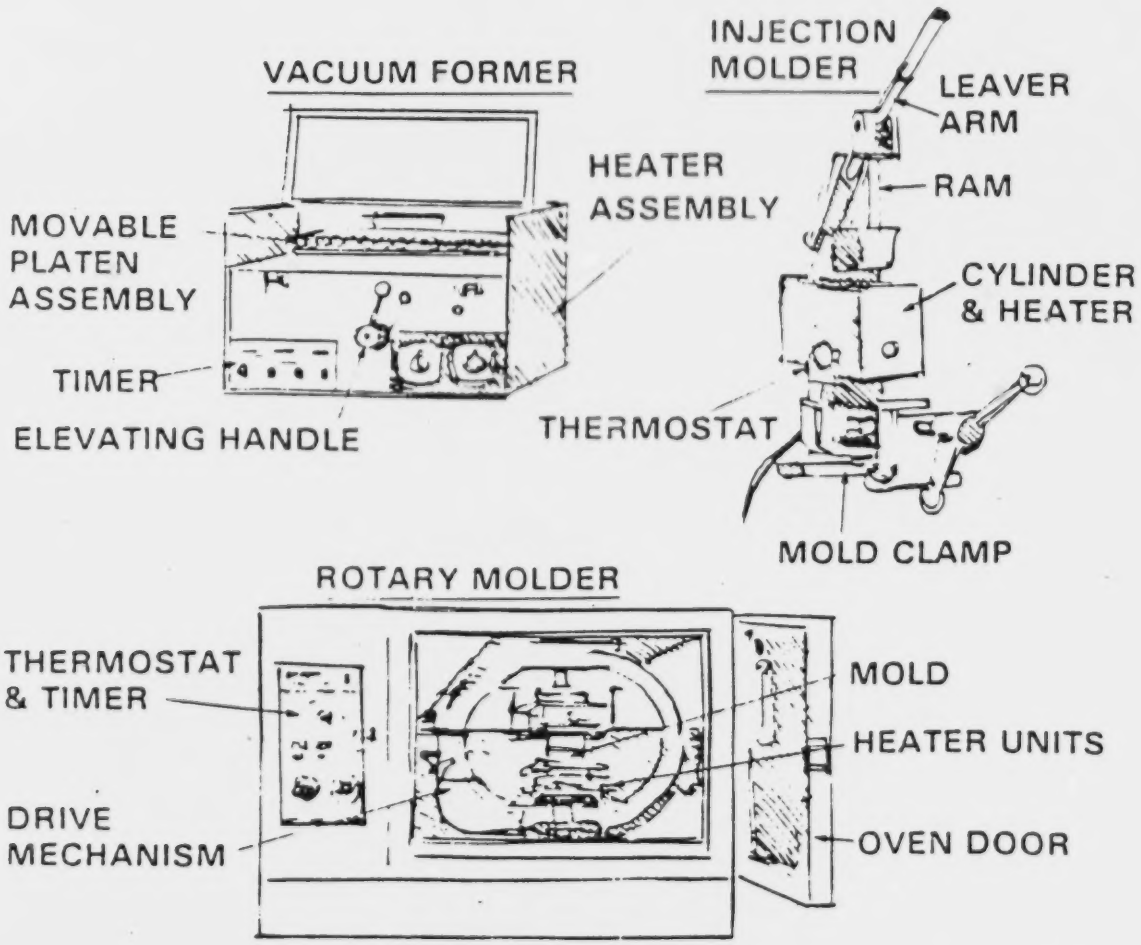
SAFETY QUIZ *(Circle True or False)*

1. *There is really no danger zone in front of a spinning lathe.*	T	F
2. *The spinning disc or material should never be touched with the hands.*	T	F
3. *2" is the correct working distance between the tool rest and the disc.*	T	F
4. *Eye safety protection is not necessary when spinning since there are no chips.*	T	F
5. *There is a correct tool for each of the various spinning operations.*	T	F
6. *The tool bit should be adjusted only when the tool holder is locked in the tool post.*	T	F

MACHINE SAFETY - Manufacturing / Construction

Safety Tips: ***PLASTICS TECHNOLOGY***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *All three of these machines operate with heating units - use with caution.*
6. *Do not overheat - match heat/timecycle with material being used.*
7. *Observe and stay clear of pinch points.*
8. *Do not over pressure Injection Molder Ram.*



12.61

PLASTICS TECHNOLOGY

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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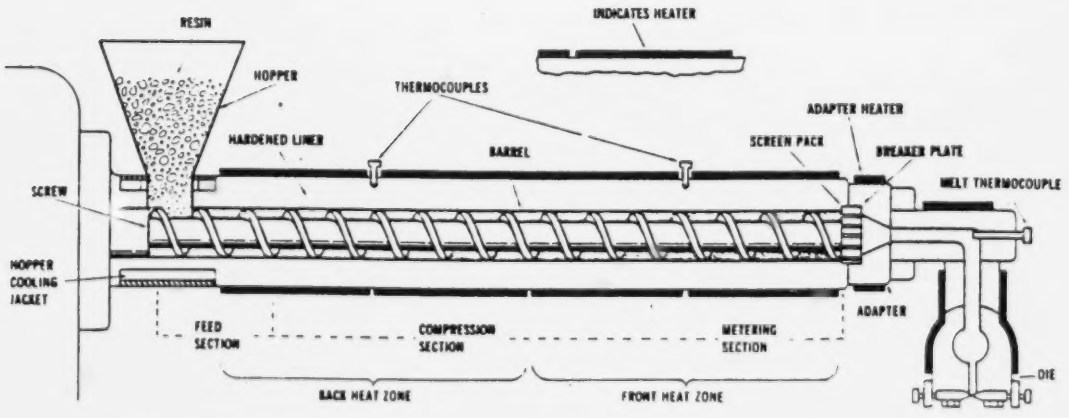
SAFETY QUIZ *(Circle True or False)*

1. *The injection molder cannot be over pressurized.*	T	F
2. *The heat and time cycle should be matched with the type of material.*	T	F
3. *There are no pinch points on this type of equipment.*	T	F
4. *The work piece is usually too hot to touch with bare hands when formed or completed.*	T	F

Safety Tips: **PLASTICS EXTRUSION**

1. *Work in a well-ventilated area. Do not breath plastic fumes because some are toxic.*
2. *Work on a heat-resistant surface.*
3. *Wear safety glasses and heat-resistant gloves.*
4. *Keep a general purpose fire extinguisher in the work area.*
5. *Do not touch the hot plastic extrudate, extruder barrel, or die.*
6. *Learn the safe operation of the extrusion equipment.*
7. *Make sure all machine control and moving part guards are in place and working.*
8. *Do not place your hands, face, or body in front of the die.*
9. *Do not touch the electric heater wires.*
10. *Keep your hands and arms out of the hopper.*
11. *Keep your hands and arms out of the puller.*



The extrusion process.

PLASTICS EXTRUSION

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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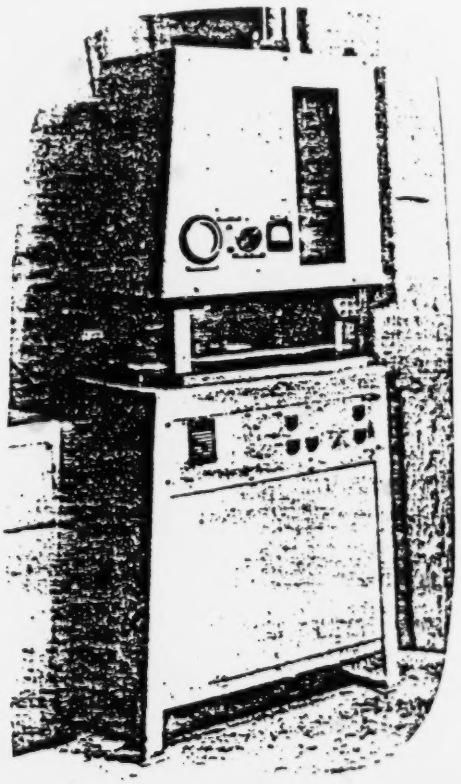
SAFETY QUIZ *(Circle True or False)*

1. *Avoid reaching into the hopper at all times.*	T	F
2. *Wear plastic or rubber gloves when working on this machine.*	T	F
3. *Perform all work operations on a heat-resistant surface.*	T	F
4. *Wear eye protection at all times.*	T	F
5. *All plastic fumes are non-toxic.*	T	F
6. *Have a fire extinguisher available at all times.*	T	F
7. *Know the locations of your heater elements.*	T	F

Safety Tips:

INJECTION MOLDING

1. *Work in a well-ventilated area. Do not breath plastic fumes because some are toxic.*
2. *Work on a heat-resistant surface.*
3. *Wear safety glasses and heat-resistant gloves.*
4. *Keep a general purpose fire extinguisher in the work area.*
5. *Learn the safe operation of the injection molding machine.*
6. *Make sure the safety gate and all of the safety switches are working before you use the injection molding machine.*
7. *Make sure all machine control and moving part guards are in place and working.*
8. *Do not burn yourself on the hot injection machine nozzle and barrel.*
9. *Do not put your hands and arms into the injection machine hopper.*
10. *Be careful not to pinch your fingers or arms between the clamp jaws or mold halves.*
11. *Do not touch hot plastic.*



INJECTION MOLDING

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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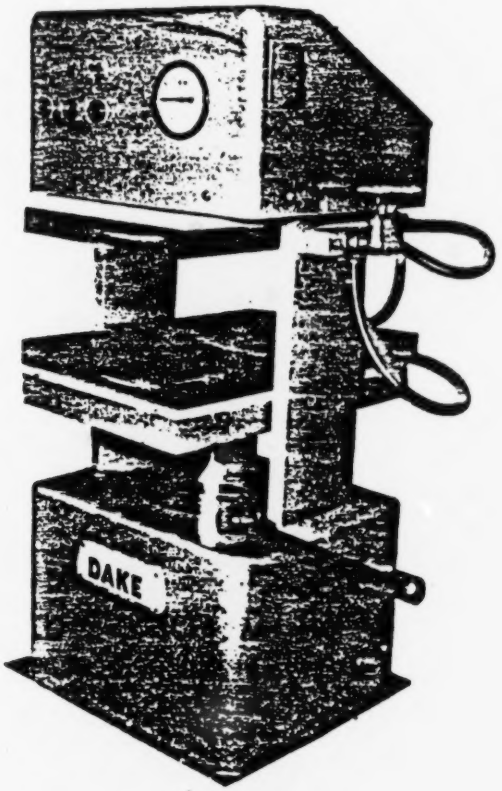
SAFETY QUIZ *(Circle True or False)*

1. *Avoid contact with the machine nozzle and barrel when the machine is being used.*	T	F
2. *Work in a well-ventilated area.*	T	F
3. *The injection machine nozzle and barrel never are hot.*	T	F
4. *Avoid having your fingers or hands between the clamp jaws or mold halves.*	T	F
5. *Safety eye protection is not needed while performing this operation.*	T	F

Safety Tips: ***COMPRESSION MOLDING***

1. *Work in a well-ventilated area. Do not breath plastic fumes because some are toxic.*
2. *Work on a heat-resistant surface.*
3. *Wear safety glasses and heat-resistant gloves.*
4. *Keep a general purpose fire extinguisher in the work area.*
5. *Do not touch hot plastics, molds, or machine parts with your bare hands.*
6. *Learn the safe operation of a compression molding press.*
7. *Make sure all machine control, mold and moving part guards are in place.*
8. *Do not pinch your hands or fingers between the mold halves or machine parts.*
9. *Keep the mold halves in line and in the center of the press platens. This prevents overstressing the press and mold.*



COMPRESSION MOLDING

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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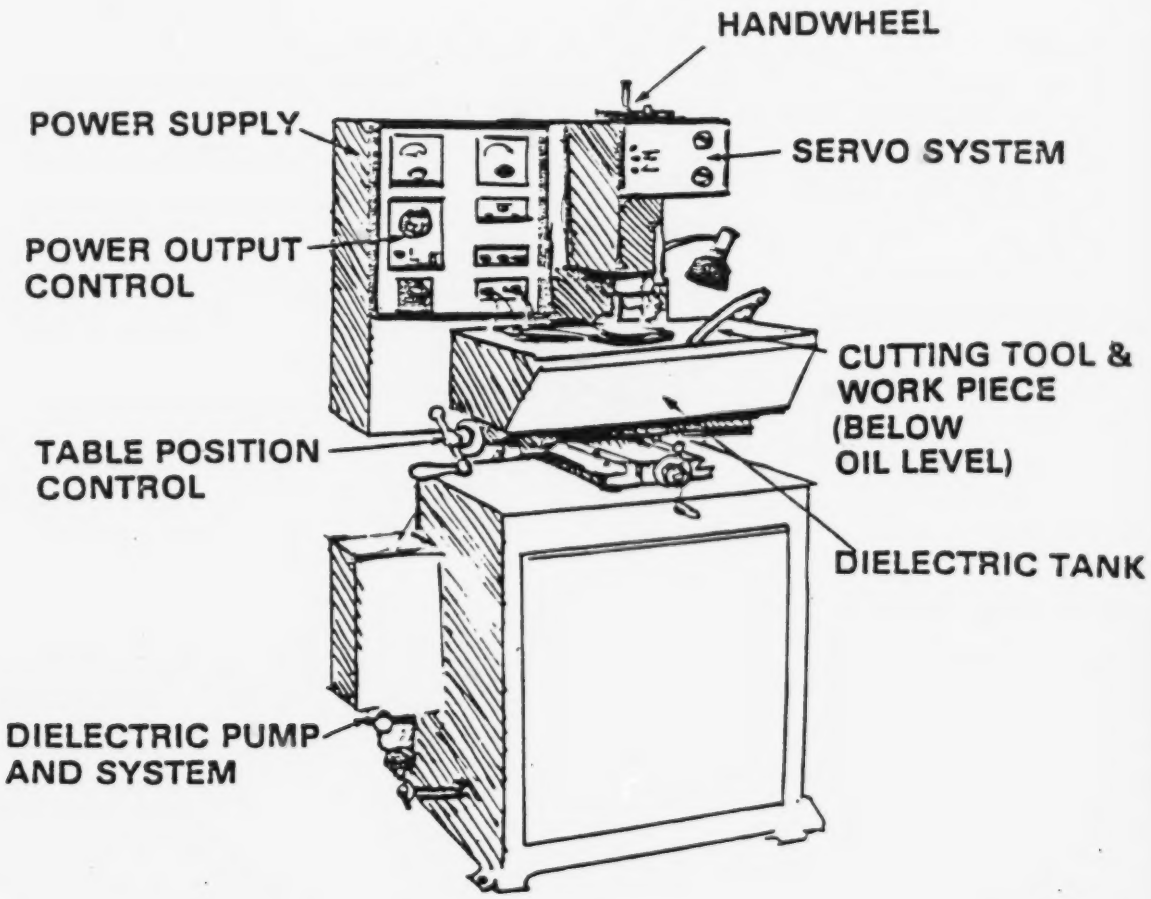
SAFETY QUIZ *(Circle True or False)*

1. *Avoid bare hand contact with hot plastics, molds or machine parts.*	T	F
2. *Keep fingers between mold halves until you are ready to perform the compression operation.*	T	F
3. *Mold halves should be in line with the center of the press platens to prevent overstressing the press and mold.*	T	F
4. *Breathing in toxic fumes is permissible as long as the work area is well-ventilated.*	T	F
5. *Always wear eye protection.*	T	F

Safety Tips: ***ELECTRIC DISCHARGE MACHINE (EDM)***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Observe the tool voltage (300 volts) and keep clear of all charged areas.*
6. *Be sure to discharge the tool at the end of a cut.*
7. *If you spill oil, clean it up.*
8. *Do not activate the power supply until the dielectric oil tank is full and oil covers the work piece.*



12.69

ELECTRIC DISCHARGE MACHINE (EDM)

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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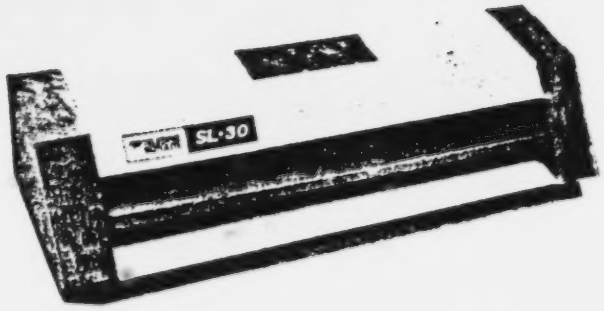
SAFETY QUIZ *(Circle True or False)*

1. *The tool must be discharged on completion of a cut.*	T	F
2. *Oil must cover the work piece and the tank should be full before activating the power supply.*	T	F
3. *All spilled oil must be cleaned up, or wiped off the machine.*	T	F
4. *The tool voltage is not high enough to be dangerous*	T	F

GRAPHIC COMMUNICATION

Safety Tips: **DEVELOPING MACHINES**

1. *Be certain that the machine is unplugged during cleaning operations.*
2. *Proper ventilation is a must with ammonia activated machines.*
3. *Do not directly inhale any activation fluid.*
4. *All covers/shields should be in place during operation protecting the operator from light sources.*
5. *When pouring activation fluid, wear eye protection and poor slowly.*
6. *Avoid splashing of activation fluid.*
7. *When handling materials, paper, film, etc., keep your fingers out of your mouth.*
8. *Avoid inserting your fingers into the infeed slot.*



DEVELOPING MACHINE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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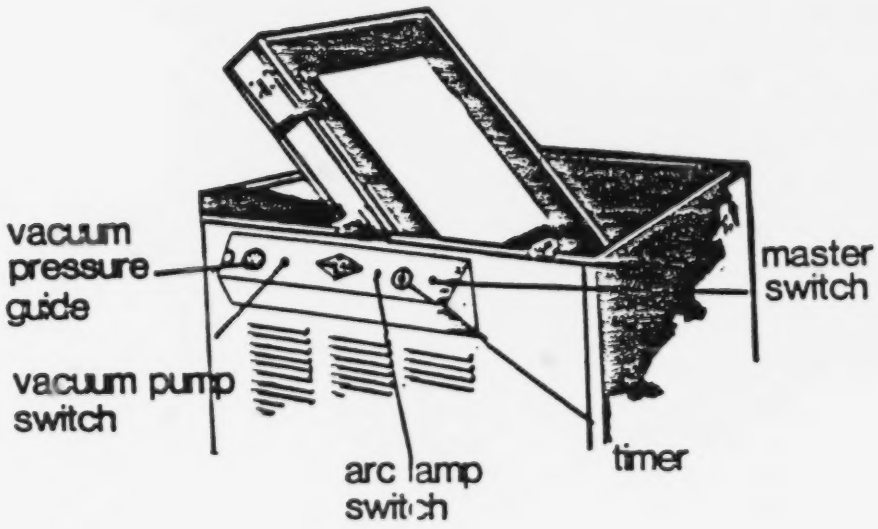
SAFETY QUIZ *(Circle True or False)*

1. *When pouring activation fluid, do it rapidly.*	T	F
2. *Plug the machine in during cleaning operations.*	T	F
3. *Be sure all internal light is covered when operating the machine.*	T	F
4. *Be certain that fingers are clear of the infeed opening.*	T	F
5. *Avoid inhaling activating fumes.*	T	F

Safety Tips: **PLATEMAKER**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards and vents are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure power is disconnected when making adjustments or opening doors of the exposure unit.*
6. *Be sure only one individual operates the unit at one time.*
7. *Do not look into or toward the exposure unit when operating.*
8. *Place only flat material under the vacuum frame. If register pins are used, caution should be exercised in selecting very shallow pins to be used in the vacuum frame.*
9. *Report any faulty or poor electrical connections to the instructor.*
10. *Keep area clear of flammable or conductive materials.*
11. *Before leaving the area make sure that all materials are returned to proper storage areas and all switches and dials are in off positions.*



PLATEMAKER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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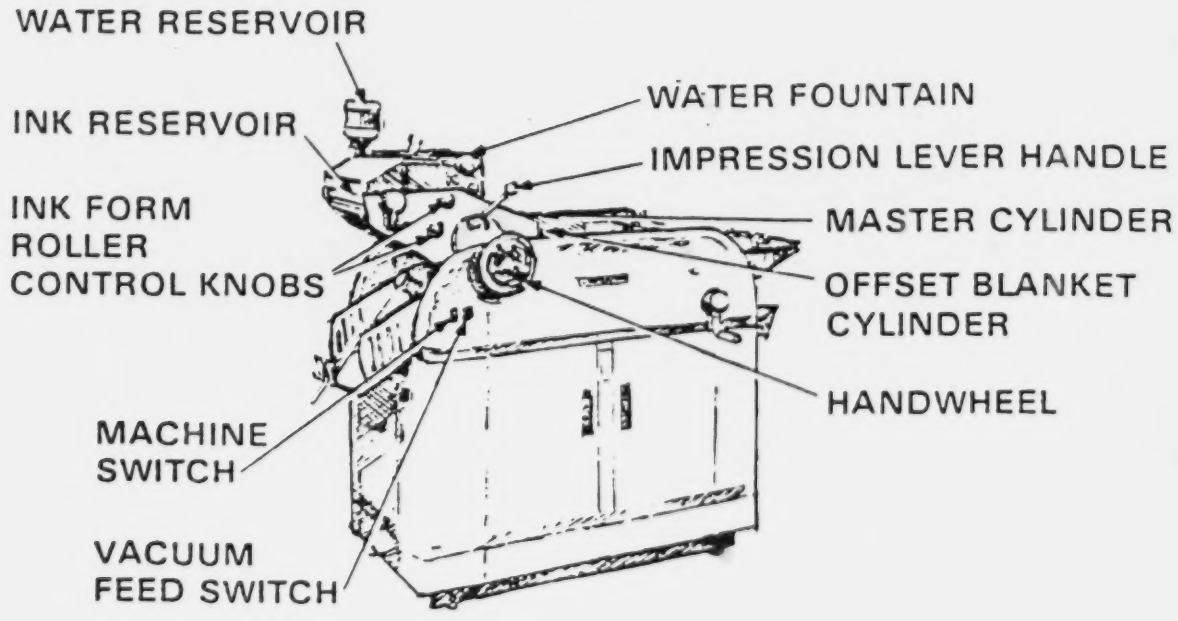
SAFETY QUIZ *(Circle True or False)*

1. *The exposure unit can be viewed during operation.*	T	F
2. *Power should always be disconnected when doors, vents, or guards are not in proper place.*	T	F
3. *Any register pins can be used in the vacuum frame to help register the material being exposed.*	T	F
4. *You should be alert to keeping others away from the exposure area while it is operating.*	T	F
5. *The surrounding area must be kept clear of any flammable or conductive materials.*	T	F

Safety Tips: ***OFFSET PRINTING PRESS***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Never reach for misprinted or dropped paper while the press is in operation.*
6. *Do not make internal adjustments while the press is in operation.*
7. *Do not clean the press while it is in operation.*
8. *The instructor should determine the operating speed.*
9. *Never reach across the press while it is in operation.*
10. *When finished with the press, it must be clean and all paper, equipment, and tools must be returned to proper storage.*



OFFSET PRINTING PRESS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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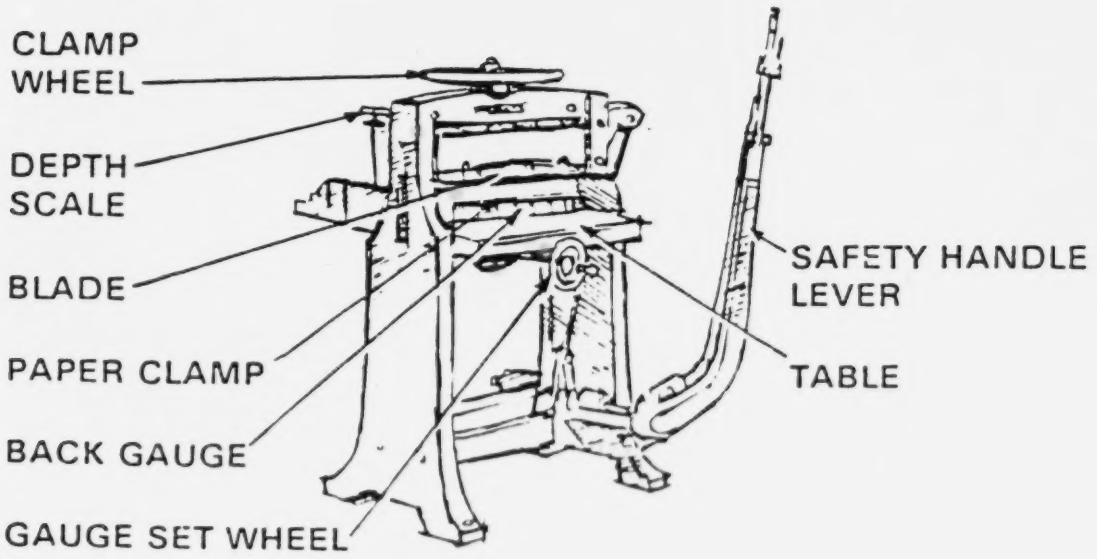
SAFETY QUIZ *(Circle True or False)*

1. *The gears need not be covered while the press is in operation.*	T	F
2. *The machine must be stopped before misprinted or dropped paper is removed from the press.*	T	F
3. *Final adjustments may be made while the machine is running.*	T	F
4. *You should be alert to keeping others away from the press while it is in operation.*	T	F
5. *It is safe to reach across the press when it is operating.*	T	F

Safety Tips: **PAPER CUTTER**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Changing or adjusting of the knife must be done by the instructor only.*
6. *All items other than the paper to be cut must be kept off the tables.*
7. *Both hands must be kept on the controls during the complete clamping and cutting cycle.*
8. *Floor area around the machine and controls must be clear of trimmings.*
9. *All adjustment of the machine, positive stops or guides must be made with the power off.*



PAPER CUTTER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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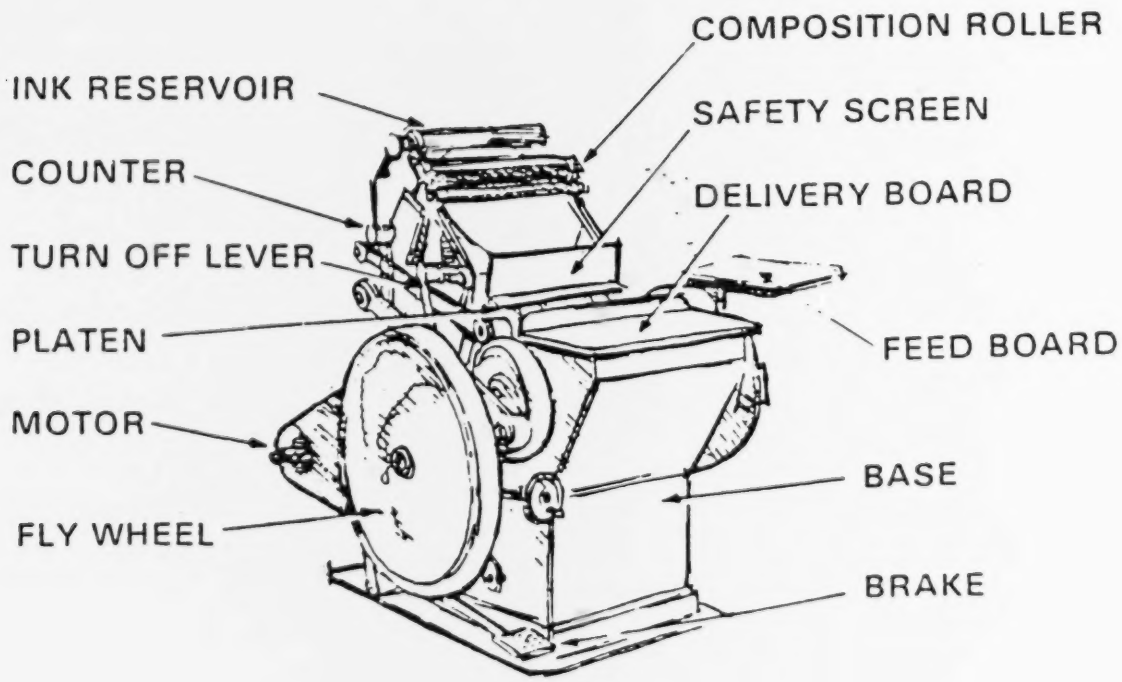
SAFETY QUIZ *(Circle True or False)*

1. *Since there are no chips involved, safety glasses are not required to operate this machine.*	T	F
2. *The floor must be kept clean around the paper cutter.*	T	F
3. *It is alright to cut thin gage metal on this machine.*	T	F
4. *Stops or gages should be adjusted only when the machine is turned off.*	T	F
5. *Hands should always be kept clear of the clamp and the cutter.*	T	F

Safety Tips:

PLATEN PRINTING PRESS

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Operate the press at a speed that matches your ability to feed the paper.*
6. *Apply ink to the ink plate prior to starting the press.*
7. *Make sure the grippers are not in the way of the type form.*
8. *Only one operator at the press at a time.*
9. *Keep your hands out of the press when creating an impression.*



PLATEN PRINTING PRESS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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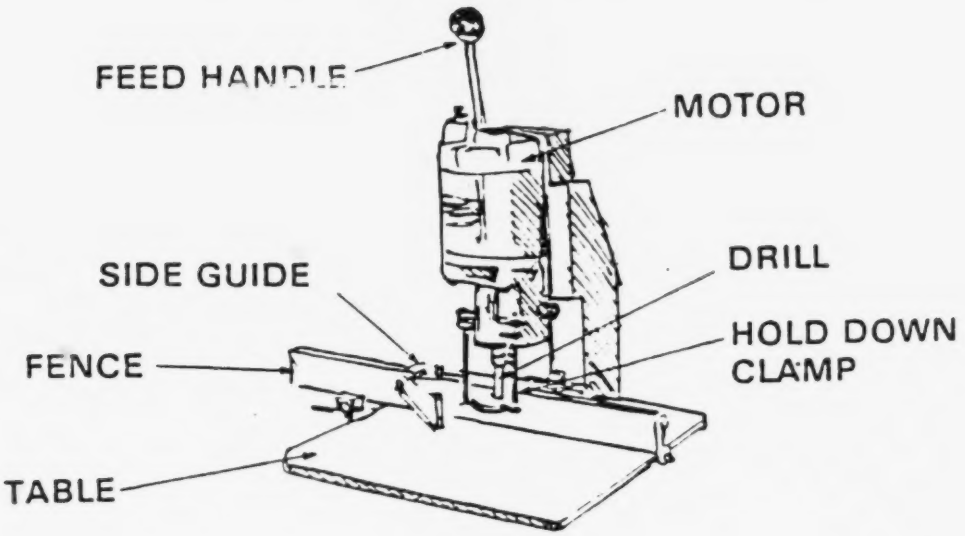
SAFETY QUIZ *(Circle True or False)*

1. *Operate the press at a speed that is safe for your ability level.*	T	F
2. *Loose clothing or hair must be confined.*	T	F
3. *The position of the grippers is not important.*	T	F
4. *The ink plate may be inked while the press is in operation.*	T	F
5. *Three or four people can successfully operate the platen press at the same time.*	T	F

Safety Tips:

PAPER DRILL

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure power is disconnected when making adjustments.*
6. *Keep hands clear of drilling area.*
7. *Be sure only one individual operates the unit.*
8. *Never touch the drill immediately following the drilling operation since it could be hot.*



PAPER DRILL

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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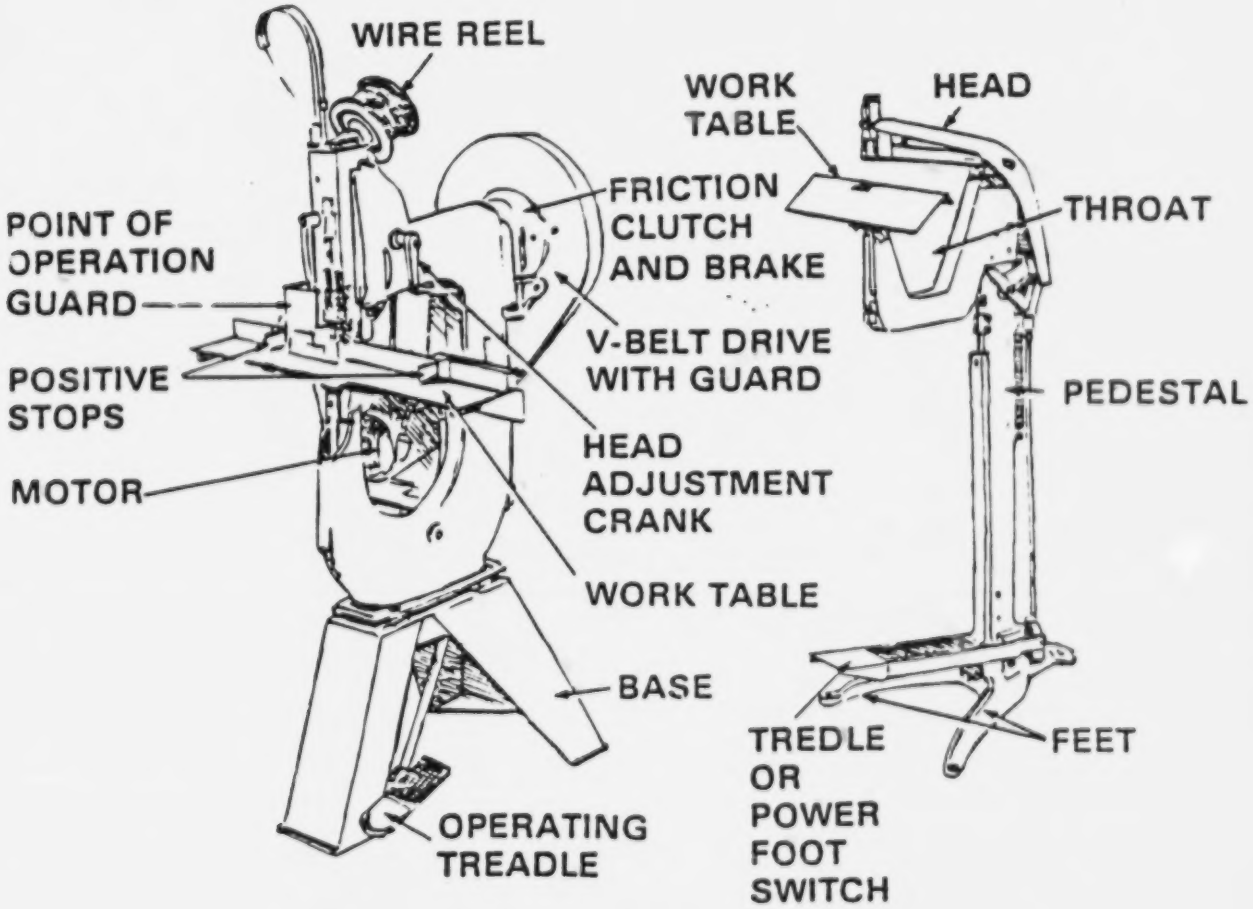
SAFETY QUIZ *(Circle True or False)*

1. *Guides or positive stops can be adjusted while the drill is running.* T F
2. *When drilling paper, the drill bit does not get hot.* T F
3. *Only one person should operate the unit at one time.* T F
4. *Hands must be kept clear of the hold down and drilling area.* T F

Safety Tips:

STAPLER AND STITCHER

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure power is disconnected on electric driven units when loading or making adjustments.*
6. *Keep hands clear of stapling or stitching area.*
7. *Do not exceed the capacity of the unit.*
8. *Be sure only one individual operates a unit.*



STICHER STAPLER

12.83

STAPLER AND STITCHER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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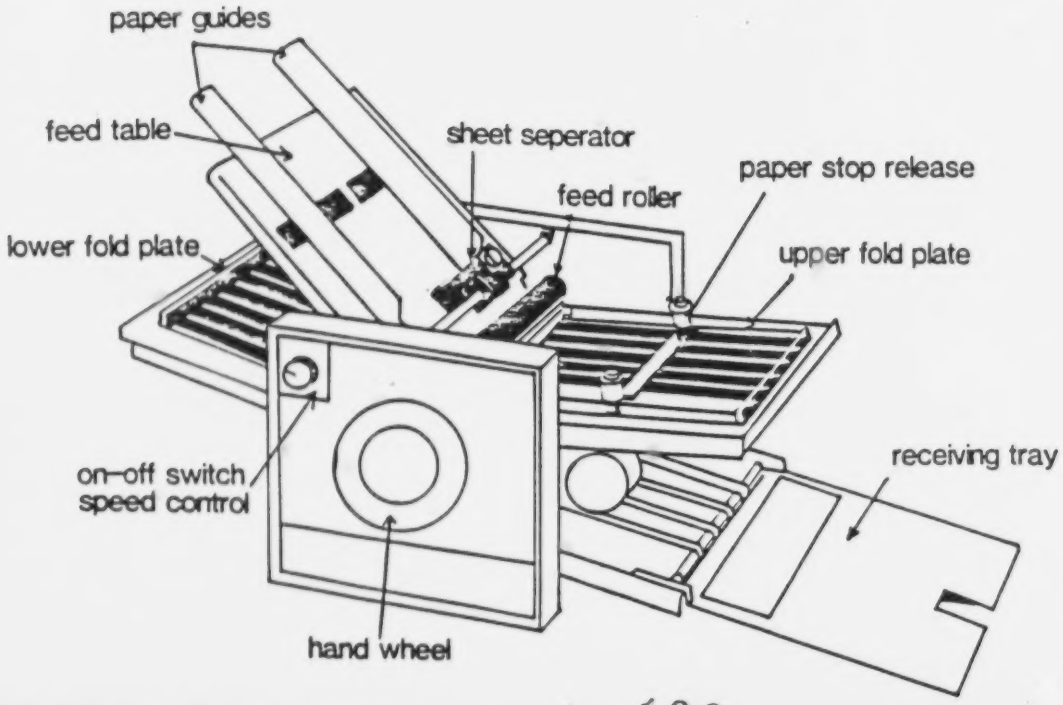
SAFETY QUIZ *(Circle True or False)*

	T	F
1. *Work of any thickness can be stapled or stitched.*	T	F
2. *Only one person should operate the unit at one time.*	T	F
3. *Minor adjustments can be made with the machine idling under power.*	T	F
4. *Hands must be kept clear of the stapling or stitching area.*	T	F

Safety Tips:

PAPER FOLDER

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Never reach for a jammed or mis-folded piece of paper while the machine is in operation.*
6. *Make all adjustments before operation and with the power disconnected.*
7. *Run the folder at a speed which is compatible to your ability.*
8. *Disconnect the power while changing folding, perforating, scoring, and slitting heads.*
9. *Give the machine your undivided attention at all times.*
10. *Notify the instructor of any machine malfunctions.*
11. *Before leaving the area, make sure that it is clean and all equipment is returned to the proper storage areas.*



12.85

PAPER FOLDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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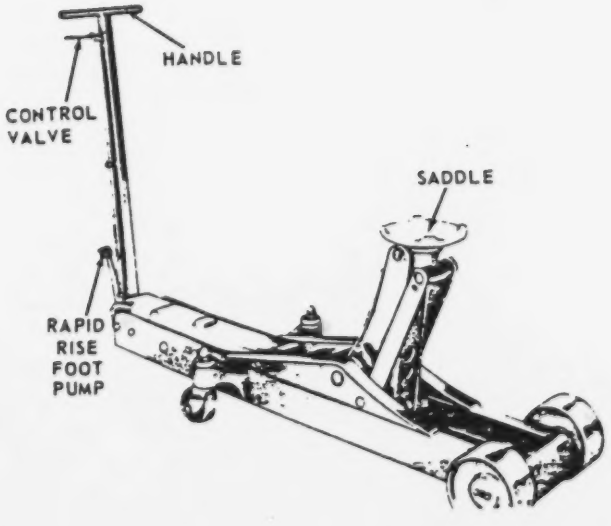
SAFETY QUIZ *(Circle True or False)*

1. *Extreme caution must be taken to secure loose clothing, jewelry, or long hair when operating.*	T	F
2. *Mis-folded or jammed paper is to be removed with machine operating at its slowest speed.*	T	F
3. *Changes in folding, perforating, scoring, or slitting can be made at any time during the machine operation.*	T	F
4. *The folder should be operated at a speed compatible with your ability.*	T	F

ENERGY TRANSPORTATION

Safety Tips: **LIFTS-FLOOR JACKS**

1. *Lift saddles must be properly located and in secure contact.*
2. *When using a floor jack, always use jack stands.*
3. *Once saddles are located, apply some pressure, stop and examine them again before lifting the car.*
4. *If an end lift, or a floor jack, is being used on a rough or soft surface, (this prevents it from rolling forward or backward) release the hand brake and place the transmission in neutral. In that either the car or the lift must move as the lifting or lowering occurs, this will prevent saddle slippage.*
5. *When raising the entire car, watch for any side or overhead obstructions.*
6. *Make certain that the lift safety lock is securely engaged before getting under the car.*
7. *Never remove a lift or jack from another mechanic's setup without checking with him/her first.*
8. *If it is necessary to change the raised height of the vehicle during the job, do not move it until all persons are "out from under."*
9. *Always check for equipment, parts or personnel beneath the car before lowering.*
10. *Lower <u>slowly</u> and watch the car during the entire descent.*



LIFTS-FLOOR JACKS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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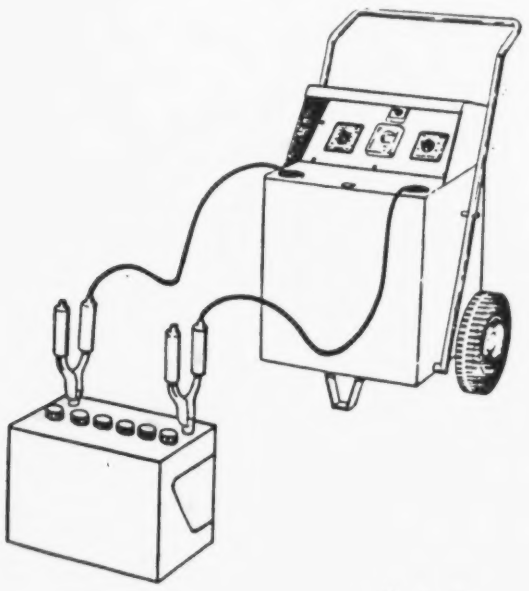
SAFETY QUIZ *(Circle True or False)*

1. *When working under a car, never use the floor jack by itself, use jack stands.*	T	F
2. *When you're ready to lower the car, open the control valve quickly.*	T	F
3. *Keep an eye on overhead obstructions when raising the car.*	T	F
4. *Warn others working under a car that you are going to raise it.*	T	F
5. *Wear appropriate eye protection.*	T	F
6. *Be sure to locate properly all lift saddles before raising the car.*	T	F

Safety Tips:

BATTERY CHARGER

1. *Before using charger, make sure it is in a safe area, one that is well-ventilated.*
2. *Use suitable clothing and eye protection.*
3. *Make sure charger is shut off before and after using.*
4. *Clean battery and posts.*
5. *Remove battery caps and check fluid level.*
6. *Connect proper cable to proper post.*
7. *Set charger for proper charging rate.*
8. *Ford and General Motors stipulate not to carry battery with a carrying strap.*
9. *Never short circuit a battery to test.*
10. *Never strike a battery post.*
11. *When using hydrometer, read at eye level just over battery cell.*
12. *Always check the manufacturer's operation instructions before using.*
13. *Approved eye wash facilities should be available.*
14. *Never look down into a fluid opening when charging is taking place.*



BATTERY CHARGER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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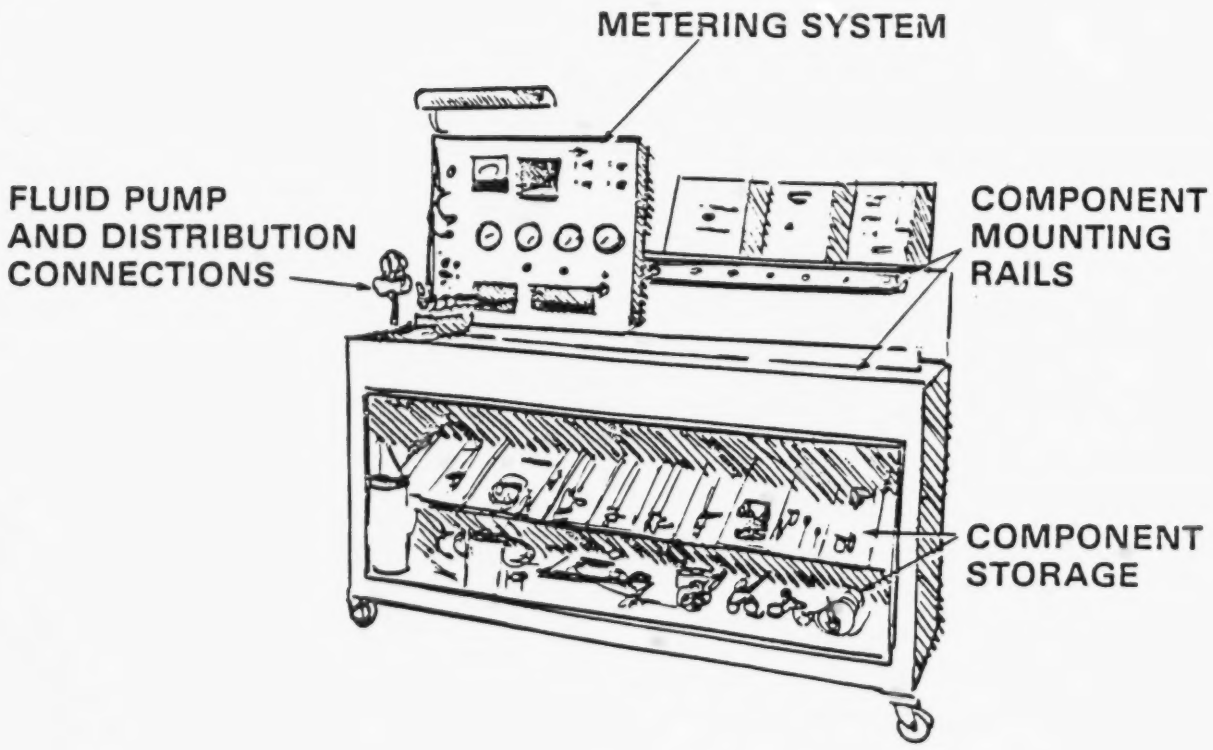
SAFETY QUIZ *(Circle True or False)*

1. *Charging should be done in a well-ventilated area.*	T	F
2. *Know the controls before using the charger.*	T	F
3. *Check the fluid levels only when the machine is off and you are wearing eye protection.*	T	F
4. *Striking a battery post is permissible as long as you are using a light object.*	T	F
5. *Always be sure the charger is off before using it.*	T	F

Safety Tips:

HYDRAULIC TRAINING UNIT

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Clean up all fluid spillage.*
6. *Exercise caution when disconnecting fluid system.*
7. *Make sure all components are securely fastened and properly connected before operating unit.*



HYDRAULIC TRAINING UNIT

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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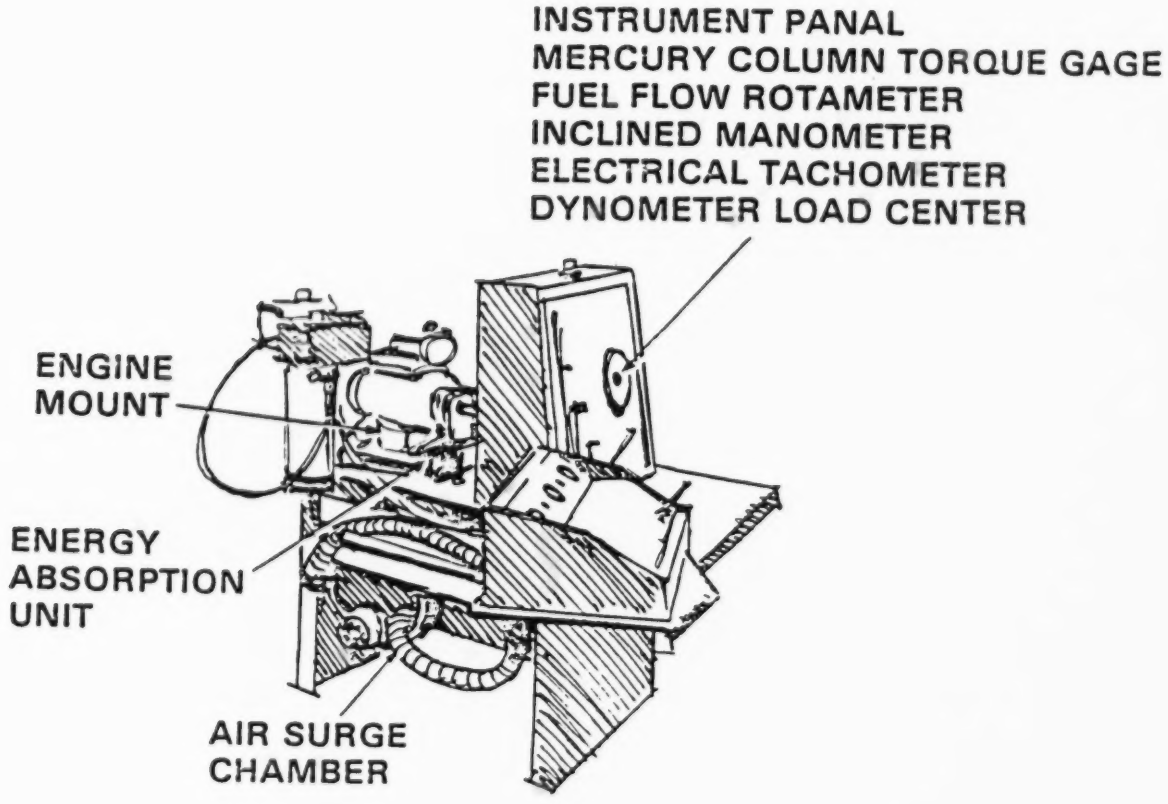
SAFETY QUIZ *(Circle True or False)*

1. *All components must be securely fastened before operating the unit.*	T	F
2. *Extreme caution must be used when disconnecting the components.*	T	F
3. *Eye protection is not required when operating this unit.*	T	F
4. *Fluid spills should be cleaned up immediately.*	T	F

Safety Tips:

SMALL ENGINE ANALYZER

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Utilize unit only with proper exhaust ventilation system.*
6. *Exercise caution when handling fuel, filling fuel tank, wipe up all spillage. Inspect fuel system frequently for defects.*
7. *Make sure all engines have proper lubrication and are mounted securely.*
8. *Utilize caution while operating and after operation, because engine will be hot.*



SMALL ENGINE ANALYZER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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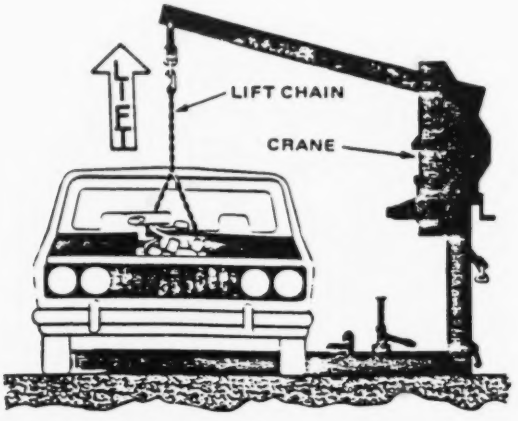
SAFETY QUIZ *(Circle True or False)*

1. *After testing, the engine is usually too hot to touch.*	T	F
2. *The oil level in the engine should be checked before testing.*	T	F
3. *Since the engine runs only a short time, exhaust ventilation is not critical.*	T	F
4. *Small amounts of spilled fuel are not really hazardous.*	T	F
5. *The engine must be mounted securely.*	T	F

Safety Tips: *CRANE OR CHAIN HOIST*

1. *Stand clear at all times.*
2. *Lower the engine as soon as it is clear of the car.*
3. *Never roll the crane with the load high in the air. Keep it just clear of the floor.*
4. *Never leave the engine suspended while working on it. Lower to the floor or place on a suitable engine stand.*
5. *Never leave the crane or hoist with the load suspended. If you must leave, even temporarily, lower.*
6. *When moving heavy loads, alert your fellow mechanics.*
7. *Never give the load, when suspended by a chain hoist attached to an overhead track, a hard shove and let it coast along. Move it slowly and stay with it.*
8. *Attaching cables, chains, bolts, etc., must have ample strength.*
9. *When using nuts to attach lift cables, the nut must be fully one. When using cap screws, they must have a thread engagement depth one and one-half times the diameter.*
10. *Always check the manufacturer's operation instructions before using.*
11. *Hard hat protection is recommended.*
12. *Wear eye protection.*
13. *Check cables periodically for breaks, frays, etc.*



CRANE OR CHAIN HOIST

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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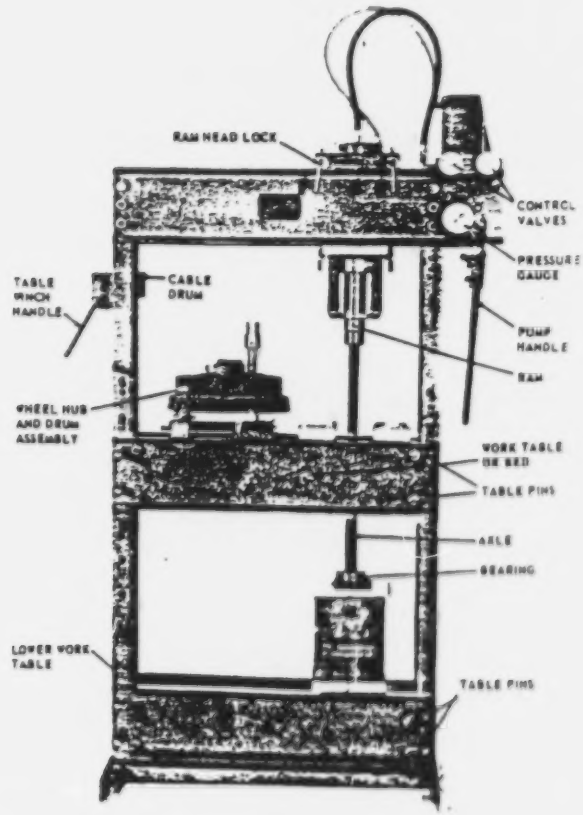
SAFETY QUIZ *(Circle True or False)*

1. *Don't prolong hanging the engine as soon as it clears the car, lower it.*	T	F
2. *Warn fellow worker/students when moving heavy loads.*	T	F
3. *Check cables on a regular basis for breaks, frays, etc.*	T	F
4. *Keep crane loads high in the air at all times.*	T	F
5. *Move all loads slowly and stay with it.*	T	F

Safety Tips:

HYDRAULIC PRESS

1. *Make sure the table pins are in place.*
2. *Be sure the table winch is slacked off.*
3. *Stand free while pressure is applied.*
4. *Apply pressure commensurate with the job.*
5. *Shield brittle parts such as bearings to protect against flying objects.*
6. *Engage ram securely and in line with work.*
7. *Wear eye/face protection when operating.*
8. *Be careful of part snap-back if the tool slips.*



HYDRAULIC PRESS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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SAFETY QUIZ *(Circle True or False)*

1. *When there is the chance of part breakage, wear eye/face protection.*	T	F
2. *The placement of the ram over the work is not necessary.*	T	F
3. *Before operating, slack off the table winch.*	T	F
4. *Engage the ram securely.*	T	F
5. *Once pressure is applied, snap-back is impossible.*	T	F

PORTABLE POWER TOOL SAFETY

(Guidelines/Test)

PORTABLE POWER TOOL SAFETY
(Includes Electric and Air Types)

Some of the major sources of injury associated with portable power tools are:

- *Electrical Shock*
- *Particles in the eyes*
- *Cuts and Abrasions*
- *Fire*
- *Falling Tools*

A systematic inspection is a must when safe-guarding portable power tools. The following are essential check items:

- *Proper insulation of the tool*
- *Frayed or Cut Cords*
- *Loose Plugs*
- *Oiling and Lubrication*
- *Proper Grounding*
- *Proper Guarding*

The following list of portable power tools will be included in the safety guide under the above heading in the form of a safety sheet and test, like those used for machine safety:

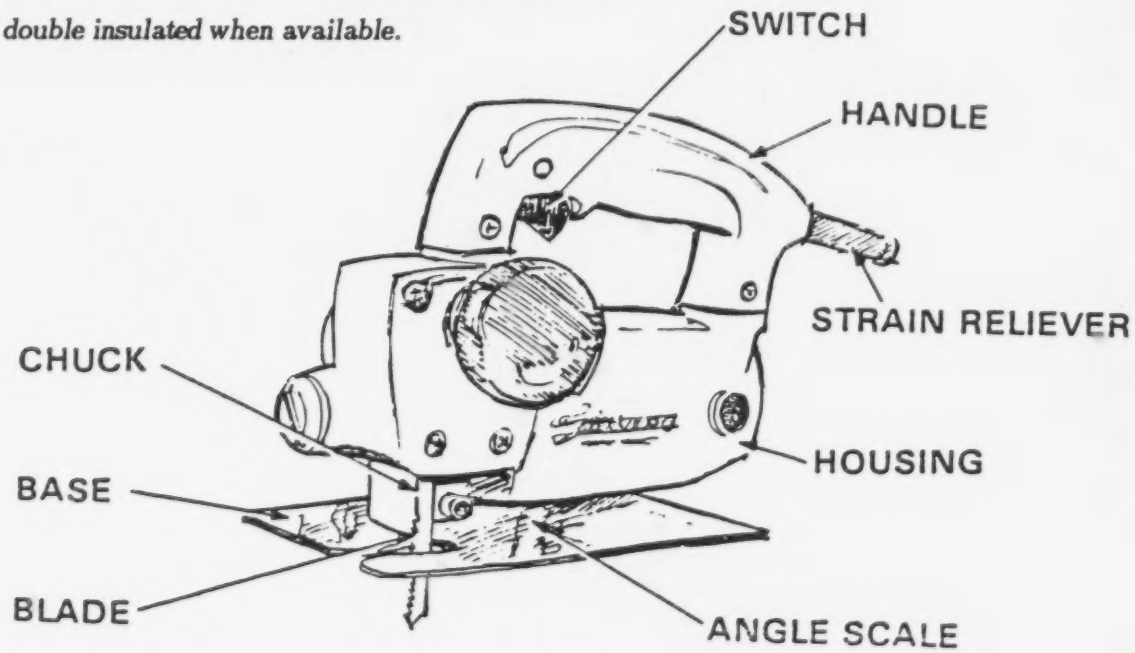
Jig Saw
Circular Saw
Electric Drill
Router
Belt Sander
Electric Plane
Disc Sander
Finishing Sander
Impact Wrench
Stapler-Nailer
Chain Saw
Explosive Actuated Tools

Reference Page 1610.

PORTABLE POWER TOOL SAFETY

Safety Tips: ***JIGSAW***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make sure the blade is the correct type for the material and that it is tightly clamped in the chuck.*
6. *Be sure the switch is off before connecting to the power source.*
7. *Use vise or clamps to securely hold material to be cut.*
8. *Keep cutting pressure constant, do not force the blade into the work.*
9. *Always keep the base tightly against the material being cut.*
10. *Do not set the saw down on the bench until it has stopped.*
11. *If the blade is in the tool, be sure to lay the tool on its side.*
12. *Use double insulated when available.*



JIGSAW

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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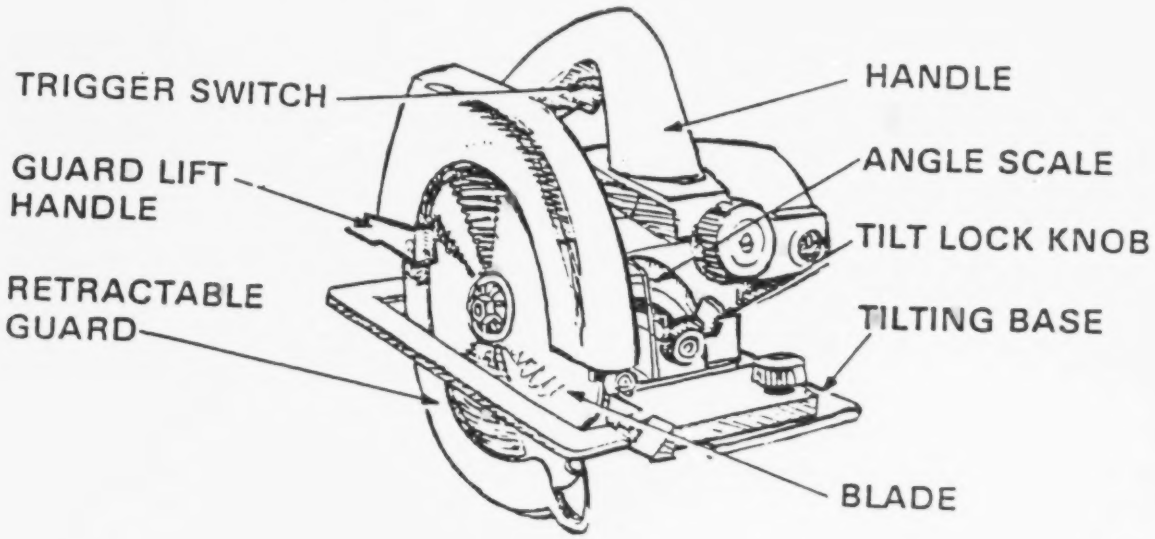
SAFETY QUIZ *(Circle True or False)*

1. *Any blade will safely cut any kind of material.*	T	F
2. *Material should be held securely before starting to cut.*	T	F
3. *Cutting pressure should be constant without forcing the blade into the work.*	T	F
4. *The base should always be flat against the work, even when the saw is tilted.*	T	F
5. *The saw can be stored using the blade and the rear of the base for support.*	T	F
6. *The housing and handle should be kept free of grease, chips, and dust.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: ***PORTABLE ELECTRIC CIRCULAR SAW***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Make sure that telescoping guard returns automatically to cover the blade after each cut.*
6. *Check the base setting for the proper depth of cut.*
7. *Make sure the power cord is clear of the blade.*
8. *Be sure the material you are cutting is adequately supported.*
9. *Do not start the cut until the saw has reached full speed.*
10. *Advance the saw slowly, straight through the work. Do not twist or turn the tool.*
11. *If the saw blade binds or smokes, stop cutting immediately.*
12. *The blade should be extended below the work until the blade Gullets clear the material.*
13. *Do not set saw down until blade stops.*



PORTABLE ELECTRIC CIRCULAR SAW

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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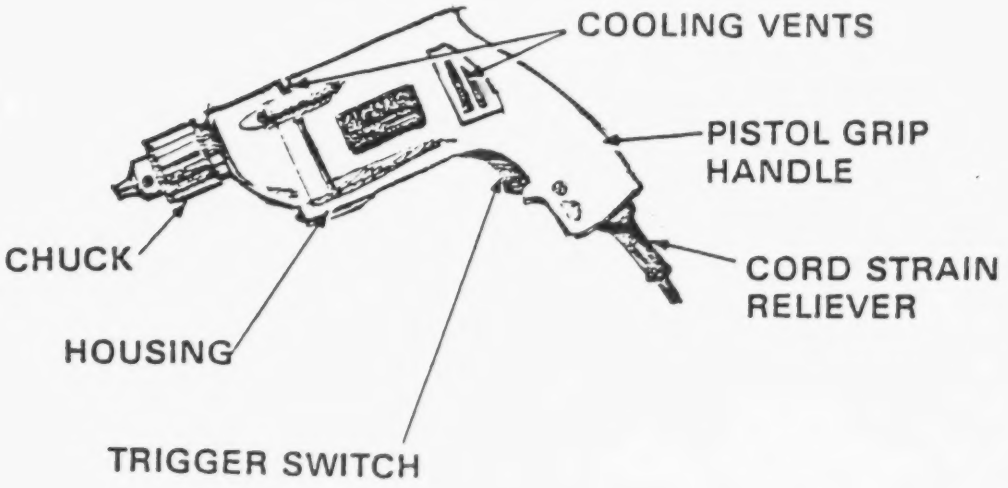
SAFETY QUIZ *(Circle True or False)*

1. *Permission should be obtained before operating this machine.*	T	F
2. *In certain cases, the guard should be wedged so that it will not be operable.*	T	F
3. *Eye protection is not necessary when using this machine.*	T	F
4. *You should not set the saw down until it has completely stopped.*	T	F
5. *The saw blade should extend at least 1" beyond the thickness of the material being cut.*	T	F
6. *This saw can safely be used for cutting curves.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: ***PORTABLE ELECTRIC DRILL***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *.Always use proper eye protection.*
5. *"Unplug" the drill when changing bits.*
6. *Make sure switch is off and key removed before connecting to power source.*
7. *Mark hole located with center punch (metal) or awl (wood) before drilling.*
8. *Be sure work is tightly clamped or secure before drilling.*
9. *Drill with straight even steady pressure.*
10. *Use double insulated when available.*



PORTABLE ELECTRIC DRILL

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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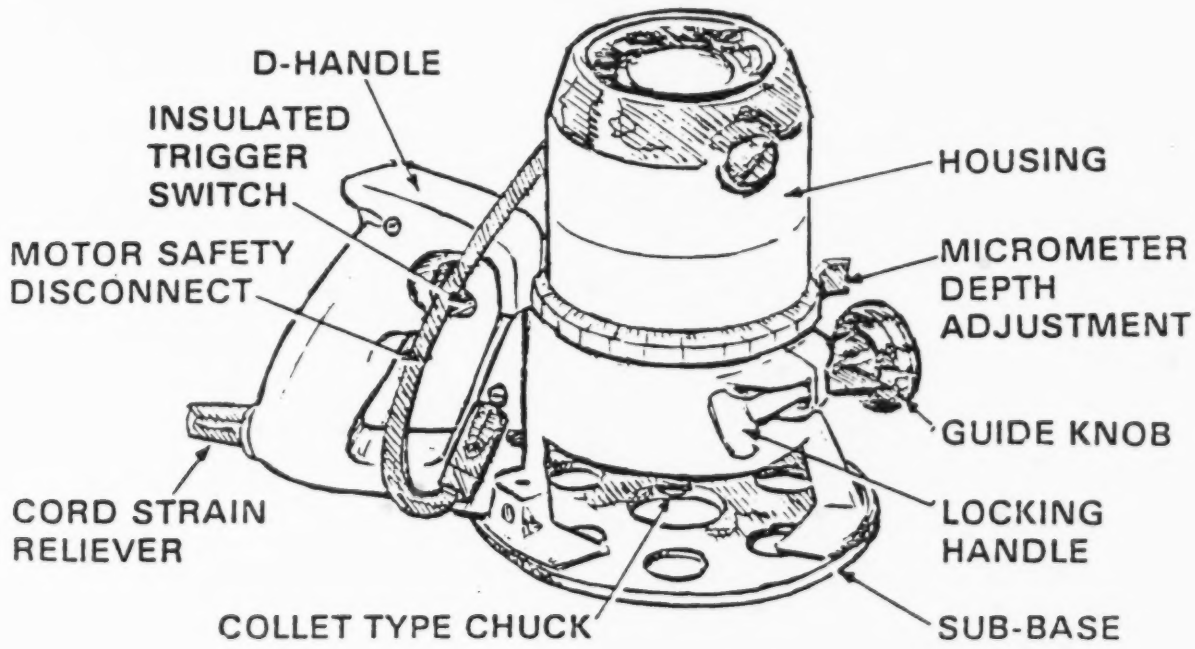
SAFETY QUIZ *(Circle True or False)*

1. *Eye protection is not really necessary when drilling wood.*	T	F
2. *The drill should be unplugged when changing bits.*	T	F
3. *It is alright to carry the drill by the cord.*	T	F
4. *Even, steady pressure should be used when drilling.*	T	F
5. *Work should be clamped while drilling.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: ***PORTABLE ELECTRIC ROUTER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure switch is off before inserting plug into power source.*
6. *Be sure collet chuck is tight and bit is secure.*
7. *Make sure work piece is clamped, or rigidly held, and the area of router travel is free of obstructions.*
8. *Hold router with both hands, cutting pressure should be constant. Do not force or jam into work.*
9. *Make a trial cut in a piece of similar scrap material.*
10. *Disconnect from power source when changing bits, making adjustments, or when router is not in use.*



PORTABLE ELECTRIC ROUTER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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SAFETY QUIZ *(Circle True or False)*

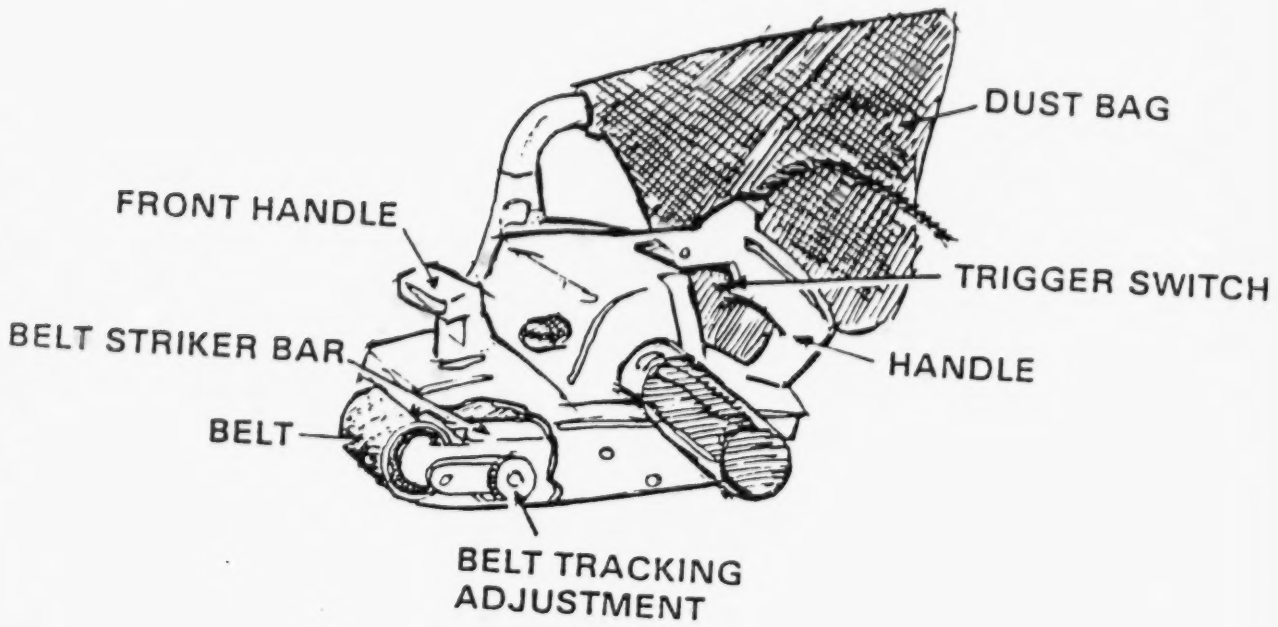
1. *It is a good idea to make a trial cut in a piece of scrap wood.*	T	F
2. *A router should always be held with both hands.*	T	F
3. *A jogging motion should be used when cutting to keep the bit cool.*	T	F
4. *It is not necessary to clamp material being routed.*	T	F
5. *The depth of cut may be safely adjusted without unplugging the tool.*	T	F
6. *The router is not really guarded.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips:

PORTABLE BELT SANDER

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Check to see if belt is in good condition, tracking properly, and is the correct grit size for the job.*
6. *Be sure switch is off before connecting to the power source.*
7. *Start sander above work; let rear of belt touch first then level the tool. Do not tilt sideways.*
8. *Sand in direction of grain moving back and forth over a large area. Do not pause in one spot.*
9. *Keep electrical cord and dust bag away from working area.*
10. *Lift sander off the work and wait until it has stopped before placing on the bench.*



PORTABLE BELT SANDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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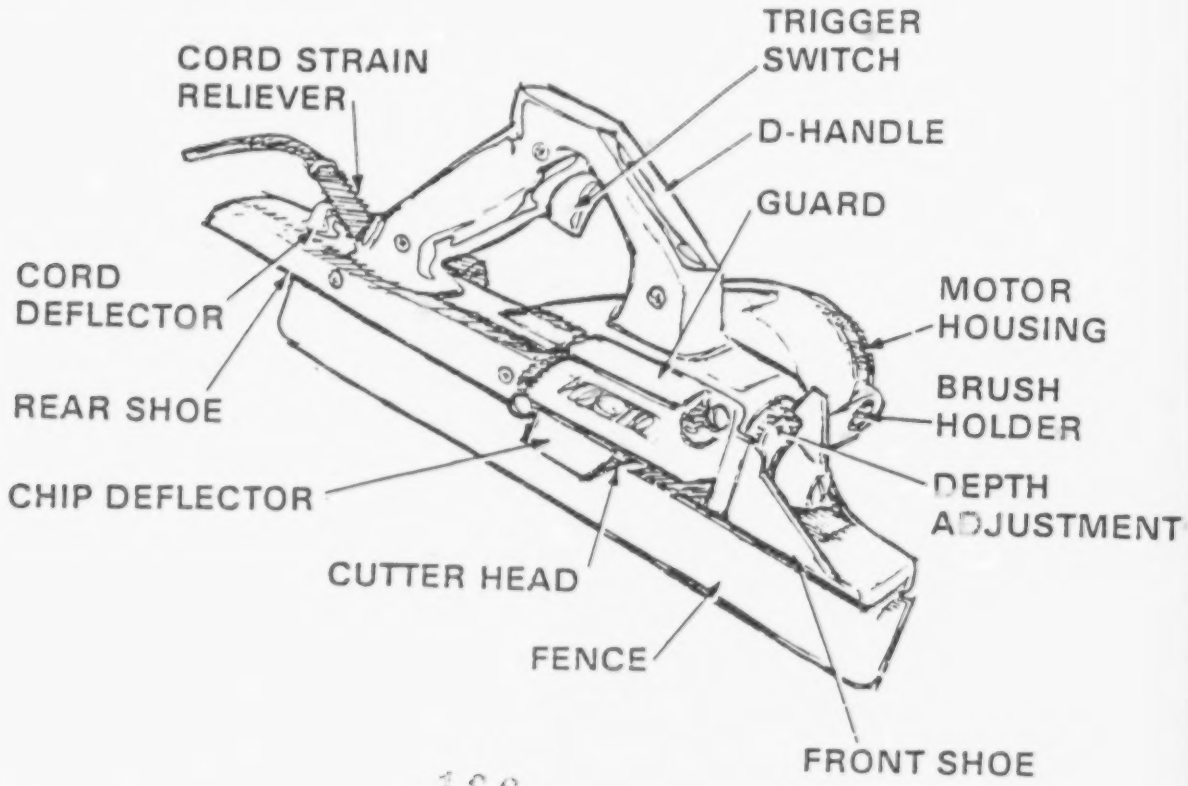
SAFETY QUIZ *(Circle True or False)*

1. *Proper belt is not a real factor in safe operation.* T F
2. *The sander should be resting flat on the work piece when starting.* T F
3. *If a firm grip is maintained on both handles, it is not critical to remove jewelry.* T F
4. *There is a relation between selecting the correct belt for the job and safety.* T F
5. *The tool should never be tilted or allowed to pause in one spot.* T F

PORTABLE POWER TOOL SAFETY

Safety Tips: ***PORTABLE ELECTRIC PLANE***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Before connecting to the power source, make sure the switch is in the off position.*
6. *Make all adjustments with the plane disconnected from the power source.*
7. *Place front shoe on the work piece, start motor, then move plane over work keeping pressure and speed constant.*
8. *Keep fence and the rear shoe tightly against the work piece until the cutter has cleared the work.*
9. *Keep hands on handle and motor housing, away from the cutter head.*
10. *Be sure of clearance for the motor.*



PORTABLE ELECTRIC PLANE

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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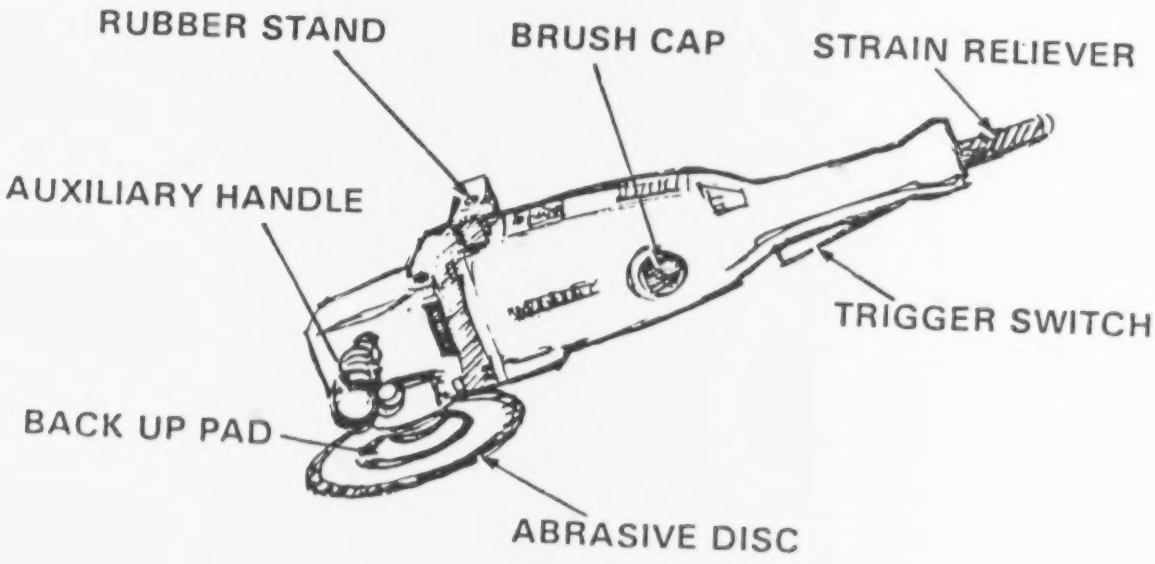
SAFETY QUIZ *(Circle True or False)*

1. *Since the cutter will not touch, it is alright to set the plane on the bench while still running.*	T	F
2. *The plane will cut deeper the more pressure is applied.*	T	F
3. *The plane should be disconnected before adjusting the depth of cut or the fence.*	T	F
4. *Eye protection is required when using a power plane.*	T	F
5. *The plane should be kept firmly against the work piece until the cut is completed.*	T	F
6. *The chip deflector is of no real safety value and can be removed.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: **PORTABLE DISC SANDER**

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Before connecting to the power source, be sure the switch is in the off position.*
6. *Make sure back up pad and disc are securely fastened to the tool. Unplug the sander when changing discs.*
7. *Do not allow the edge of the disc to touch the edge of the stock.*
8. *Stand clear of the spark line or spark area.*
9. *Sand or finish with a stroking motion; do not pause in one spot.*
10. *Set grinder or sander on back or on rubber stand when not in use and disconnect from power source.*
11. *Use double insulated when available.*



PORTABLE DISC SANDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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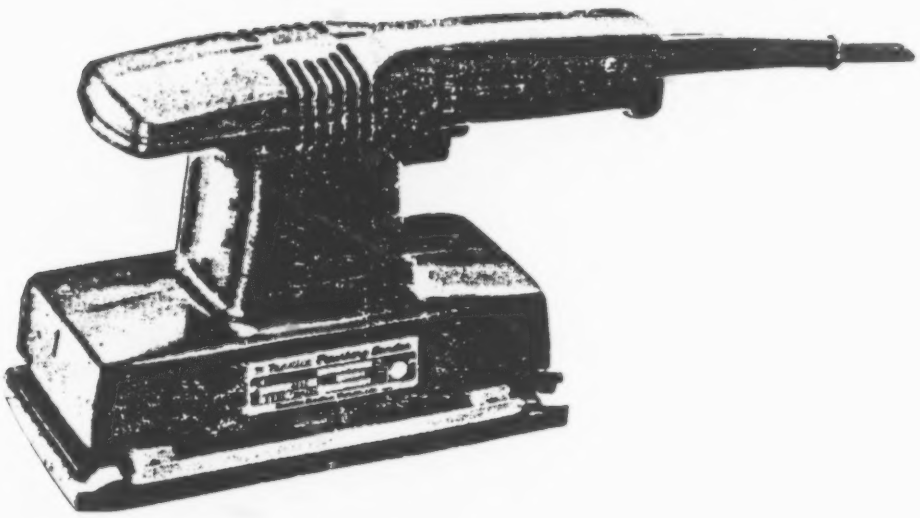
SAFETY QUIZ *(Circle True or False)*

1. *The sparks caused by grinding or sanding are warm but not dangerous.*	T	F
2. *In order to remove material fast, it is safe to grind steadily in one spot.*	T	F
3. *It is advisable to wear protective clothing while using this tool.*	T	F
4. *A fast rolling action takes place when the edge of the disc touches the edge of the stock which can throw the grinder or sander.*	T	F
5. *The grinder or sander should be unplugged and set on its back when not in use.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: ***PORTABLE ELECTRIC FINISHING SANDER***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure the switch is off before connecting to the power source.*
6. *Make sure abrasive sheet is in good condition and properly installed on the tool.*
7. *Start the tool above the work, set it down evenly, and move slowly over a wide pattern area.*
8. *Lift the sander from the work before stopping the motor.*
9. *Do not set the sander on the work bench until it has stopped running.*
10. *Never lift or carry any portable electric tool by the power cord.*
11. *Use double insulated when available.*



PORTABLE ELECTRIC FINISHING SANDER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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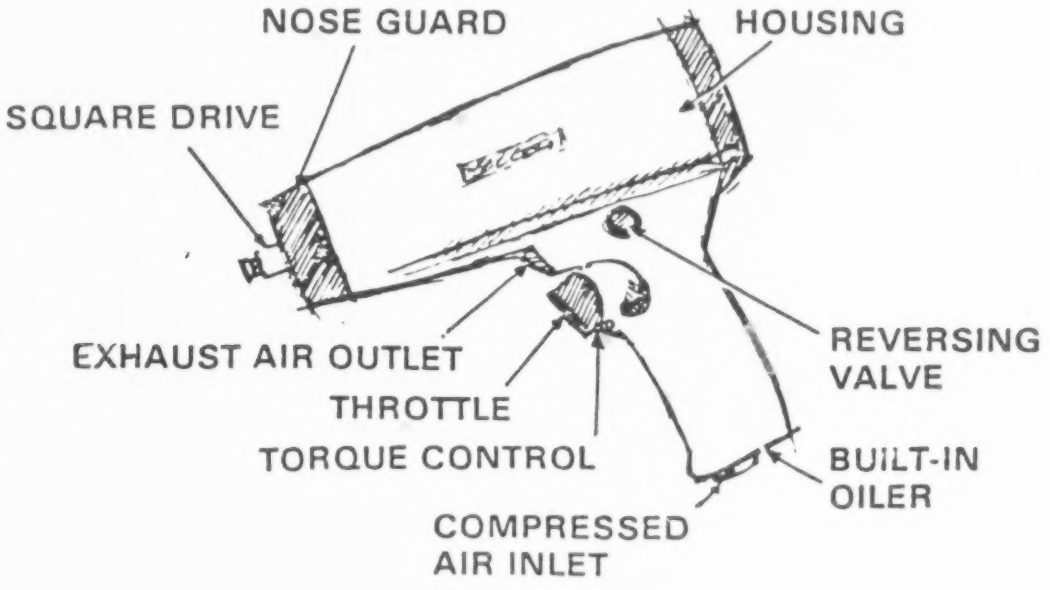
SAFETY QUIZ *(Circle True or False)*

1. *Eye protection must be worn when using the sander.*	T	F
2. *The abrasive sheet can be loosely clamped yet still be safe and efficient.*	T	F
3. *The sander should never be carried by the power cord.*	T	F
4. *The tool should be turned on only after it is placed tightly on the material to be sanded.*	T	F
5. *Lift the sander from the work before turning it off.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: ***PORTABLE AIR IMPACT WRENCH***

1. *Operate only with instructor's permission and after you have received instruction.*
2. *Remove jewelry, eliminate loose clothing, and confine long hair.*
3. *Make sure all guards are in place and operating correctly.*
4. *Always use proper eye protection.*
5. *Be sure throttle is in the off position before connecting to air supply.*
6. *Always use impact type sockets designed for use with power equipment.*
7. *Make sure work is secure, or held with clamps or tightly in a vise.*
8. *Set torque control for correct tightness before starting the job.*
9. *Be sure both hands are free to properly operate an impact tool.*
10. *Always use the tool in short bursts of power.*
11. *Quick change coupling should be an end of hose whip, not at the tool.*
12. *Always disconnect the tool when not in actual use.*
13. *Use double insulated when available.*



PORTABLE AIR IMPACT WRENCH

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

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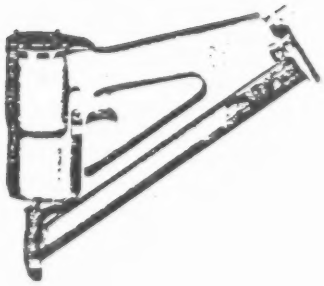
SAFETY QUIZ *(Circle True or False)*

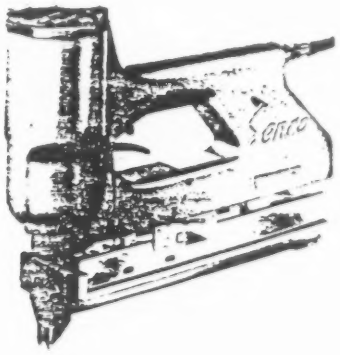
1. *It is safe to operate the impact wrench with one hand if the bolt or nut is not too tight.*	T	F
2. *Since there are no chips, eye protection is not necessary.*	T	F
3. *The sockets used must be designed for impact wrenches. Regular sockets are not adequate.*	T	F
4. *The tool should be disconnected from the air line at the end of the hose whip, not at the tool.*	T	F
5. *The impact wrench must be disconnected when not in actual use.*	T	F
6. *Short bursts of power should always be used to operate the tool.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: **STAPLER - NAILER**

1. *Study the manufacturer's operating directions and follow them carefully.*
2. *Use the correct type and size of fastener as recommended by the manufacturer.*
3. *For air-powered nailers, always use the correct pressure (seldom over 90 lbs.). Be sure the compressed air is free of dust and excessive moisture.*
4. *Always keep the nose of the stapler or nailer pointed toward the work; never toward yourself or other workers.*
5. *Check all safety features and be sure they are working. Make a test, driving the staples or nails into a block of wood.*
6. *During use on the job, hold the nose firmly against the surface being stapled or nailed.*
7. *Always disconnect the tool from the air or electrical power supply when it is not being used.*
8. *Do not rush. Position the nail or staple in place accurately and at a steady pace.*
9. *Use appropriate coupling for attaching the tool to the air hose.*





STAPLER - NAILER

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

====================*==========*==========*==========*==========*

SAFETY QUIZ *(Circle True or False)*

1. *Never point the stapler-nailer at others.*	T	F
2. *Always drive a nail or staple in as fast as possible.*	T	F
3. *Hold the tool loosely for better control of the tool operation.*	T	F
4. *Never look directly at the ejection opening of the tool unless the air supply or electrical power is disconnected and all pressure released.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips: ***CHAIN SAWS***

1. *Wear a safety helmet, safety footwear, safety glasses, gloves, and snug fitting clothing.*

2. *Never start cutting until you have a clear place to work, a secure place to stand, and a safe exit from limbs and trees.*

3. *Keep other people at a safe distance from work area.*

4. *Cut away from your body at all times, changing your position if necessary to work safely.*

5. *Stand behind and in line with engine end of saw, never beside it when engine is running.*

6. *Always hold the saw firmly with both hands. Grip the saw with your thumb on the underside of the handlebar, opposite your fingers.*

7. *When cutting limbs off a fallen tree, do not stand on the tree. Use caution when cutting limbs that support the fallen tree.*

8. *When bucking, always stand on high side of log, place pivot point against log, and use both hands on saw.*

9. *Saw should not be running after cut is completed. Always shut engine off to fill oiler or gas tank.*

10. *When carrying saw, grasp top handle with bar and chain pointing to rear.*

    CAUTION: Exhaust deflector is normally hot after saw is used and could cause a serious burn.

11. *Check chain tension frequently.*

12. *Use extreme caution when cutting small size brush and saplings. Slender material may grab the chain and whip toward you or pull you off balance.*

13. *Have an extra chain available. When chain is damaged, it should be taken off saw immediately for servicing or replacement.*

14. *During operation, cut one log at a time. Never let the nose of the bar touch the ground, another log, branch, or obstruction of any kind.*

15. *Do not smoke while fueling or operating the saw.*

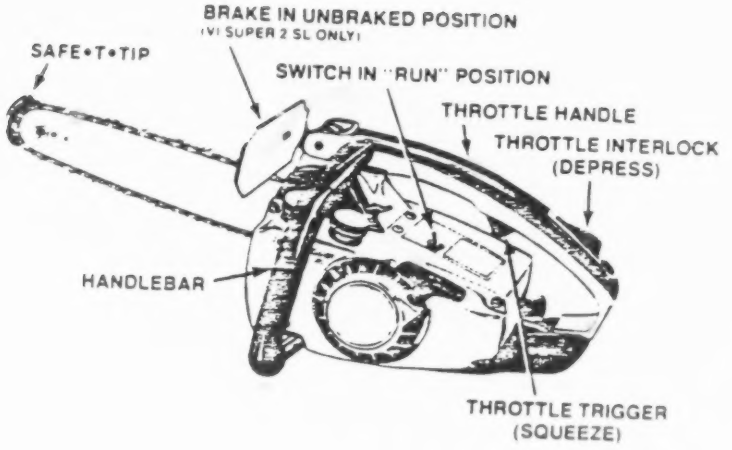
16. *Operate the chain saw only in a well-ventilated area.*

17. *If fuel is spilled on the saw, wipe clean with a rag. If fuel is spilled on the ground, bury heavily with dirt.*

18. *Always handle fuel in safety-type fuel cans that are clearly labeled. Never use glass or plastic bottles.*

19. *Avoid situations that cause kickbacks.*

20. *BE SURE YOU READ ALL SAFETY RULES AND UNDERSTAND ALL INSTRUCTIONS FOR SAFE OPERATION BEFORE USING THIS TOOL.*



CHAIN SAWS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

====================*==========*==========*==========*

SAFETY QUIZ *(Circle True or False)*

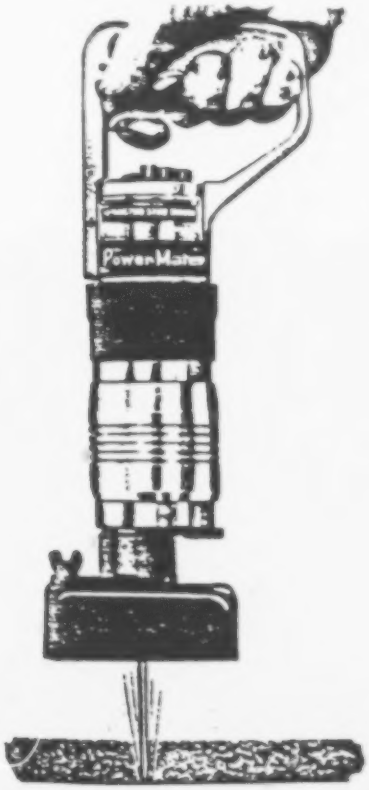
1. *Check the chain tension often.*	T	F
2. *Wear safety eyewear and a safety helmet when operating the saw.*	T	F
3. *The saw should be operated only in well-ventilated areas.*	T	F
4. *When bucking, stand on the low side of the log.*	T	F
5. *Cut away from your body at all times.*	T	F

PORTABLE POWER TOOL SAFETY

Safety Tips:

EXPLOSIVE ACTUATED TOOLS
OSHA 1910-243
ANSI A10.3

1. *Check the tool to determine if it is clean, and that all moving parts operate freely.*
2. *Be sure the barrel is free from obstructions.*
3. *If a tool develops a defect during use, the operator shall immediately cease to use it, until it is properly repaired.*
4. *Tools shall not be loaded until just prior to the intended firing time.*
5. *Neither loaded nor empty tools are to be pointed at any workmen.*
6. *In case of a misfire, the operator shall hold the tool in the operating position for at least 30 seconds. He shall then try to operate the tool a second time. He shall wait another 30 seconds, holding the tool in the operating position; then he shall proceed to remove the explosive load in strict accordance with the manufacturers instructions.*
7. *Tools shall not be used in a explosive or flammable atmosphere.*
8. *All tools shall be used with the correct shield, guard, or attachment recommended by the manufacturer. 12.24*



EXPLOSIVE ACTUATED TOOLS

Student Name _____

Class _____

Date _____ *Grade* _____

Instructor's Name _____

====================*==========*==========*==========*

SAFETY QUIZ *(Circle True or False)*

1. *Always be sure the barrel is free from obstruction before using.*	T	F
2. *Tools are used only in a flammable area.*	T	F
3. *Tools should never be pointed at anyone.*	T	F
4. *There is a proper procedure to be used in case of a misfire.*	T	F

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SAFETY IN SPECIAL ATTENTION AREAS

SAFETY IN SPECIAL ATTENTION AREAS

FOUNDRY

1. *Wear protective clothing when handling molten metals; safety eye protection, see TECHNICAL REFERENCE MATERIAL. Tennis shoes and sandals are not acceptable.*

2. *Always treat crucibles, flasks, castings, and other equipment as if they are hot; determine if they are hot before picking them up.*

3. *Ask your instructor to check your mold before closing it. Be sure it's not too damp before pouring, it could explode.*

4. *Keep flammable materials away from the area.*

5. *Light the furnace only when supervised by your instructor. Follow the manufacturer's directions for lighting.*

6. *Before removing the crucible, shut off the GAS FIRST. Then the air. Use a crucible lifter to remove the crucible from the furnace.*

7. *Carry molten metal as close to the floor as possible using a two-man pouring tool.*

8. *Keep water and wet items away from the pouring area of the foundry.*

9. *The foundry pouring area should be protected with sand to prevent accidental "Floor Explosions" caused by spills of molten metal.*

10. *In consumable pattern casting (Styrofoam): Keep the sprue basin filled to prevent firing; turn on foundry area vent fan.*

11. *In hot shell or CO2 shell molding, the two halves of the mold should be securely fastened and banked in a flask of green sand to dissipate heat; do not breathe fumes.*

SAFETY IN SPECIAL ATTENTION AREAS

ROBOTIC CONCERN

Robots work closely in the same environment with people and machines. As you work with robots, keep alert as to the following concerns:

1. *Being pinned against, or caught in between, machines or stationary objects.*
2. *Tripping over loose control or power cables.*
3. *Colliding with moving robot parts.*
4. *Robots are able to articulate within a wide range of working envelopes and axes, at high speeds, and can readily reach out of programmed areas in the event of a control, mechanical or hydraulic failure, striking something or throwing a small part like a projected missile across an area.*
5. *Risk of fire or explosion within the area because of its internal design.*
6. *Robots manipulate objects of different weights and sizes creating potential hazards.*
7. *Sudden start up/motion and automatic operations of a robot within a cycle.*
8. *Potential electrical shock.*
9. *Robots are great attention getters. Their presence alone attract observers who are unaware of the possible dangers.*

SAFETY IN SPECIAL ATTENTION AREAS

LASER CONCERNS

Lasers are valuable sources of light for exciting demonstrations and laboratory experiments in schools.

Helium-neon lasers emit a beam of visible orange-red light. Invisible, exotic, or otherwise harmful radiations are not emitted.

With a light output of only a few thousandths of a watt, these lasers should not be confused with the powerful lasers intended for burning, cutting, and drilling.

Even though the power of our laser is low, the beam should be treated with caution and common sense because it is intense and concentrated. The greatest potential for harm with a laser is to the eyes. No one should look directly into the laser beam or stare at its bright reflections, just as no one should stare at the sun or arc lamps.

The United States Department of Health, Education and Welfare and Food and Drug Administration, Bureau of Radiological Health, Rockville, Maryland 20852, regulates the manufacturers of lasers to see that users are not endangered. The federal government classifies lasers according to their power levels and specifies appropriate safety features for each level. Demonstration lasers fall into Class II and can be identified by a yellow "CAUTION" label which contains the warning "Do not stare into beam." Class II lasers have a maximum power of 1/1000th of a watt, a power judged to be eye-safe, except possibly in case of deliberate, long=term direct staring into the beam. Safety features include a pilot lamp which glows when the electrical power is "ON" and a mechanical beam stop which blocks the beam when the power is on.

Each laser is equipped with a UL-approved line cord and three-prong grounded plug. ALWAYS PLUG THE LASER INTO A GROUNDED OUTLET.

OBSERVE THE FOLLOWING:

1. *Never look into the laser beam.*
2. *Never direct the laser beam with another person's or animal eyes.*
3. *Do not operate the laser without instructor permission.*
4. *Do not operate the laser without adequate prior instruction.*
5. *Do not use the laser for any other purpose than what you were instructed to do.*
6. *Never leave the laser on and the beam emitting out.*
7. *Do not look at bright mirror like reflections of the beam.*
8. *Appropriate caution sign should be posted.*

SAFETY IN SPECIAL ATTENTION AREAS

VDT's - VIDEO DISPLAY TERMINALS

Schools are utilizing the computer more and more. Some insight as to their usage.

1. *No radiation hazard is emitted from VDT's.*
   Harvard Medical School Health Letter

2. *X-RAY, radio frequency, ultra-violet, infrared, and visible radiation associated with VDT's show that exposure levels from the display screens are well below the current exposure standards.*

3. *Extended eye exposure could present fatigue and eye irritation.*

4. *Muscle strain of the neck and back often occurs with long sitting sessions or improper positioning of the equipment.*

5. *Possible electrical shock when repairing.*

3-M - Has a slide-video presentation on VDT Safety and Occupational Hazards.
Dept. OH84-11, Box 33600, St. Paul, Minnesota 55133

For further research on VDT use and radiation contact:

American Council on Science and Health
47 Maple Street, Summit, New Jersey 07901

SAFETY IN SPECIAL ATTENTION AREAS

SOLDERING

1. *Wear eye protection, see TECHNICAL REFERENCE MATERIAL.*
2. *Before attempting to light a bench soldering furnace, make sure that the gas is off.*
3. *Be sure the furnace valves are off.*
4. *Turn the line on slowly, never turn the jets on full when lighting, adjust your flame.*
5. *Work in a well-ventilated area.*
6. *Wash hands after soldering, flux can cause burns or skin irritation.*
7. *In case of burns, flush immediately with water.*
8. *Be aware of rapid transfer of heat throughout thin metal.*
9. *Care should be taken not to burn electrical cords.*
10. *Do not leave a hot item exposed.*

SAFETY IN SPECIAL ATTENTION AREAS

ENERGY

1. *Whenever possible, work with switches and controls in the OFF position. The controls should be locked-out or the item disconnected.*

2. *Always consider an electrical circuit as LIVE until you personally confirm it is not.*

3. *Always consider a device that produces heat hot until you confirm it is not.*

4. *Do not start or throw a switch just to see what will happen. Obtain instruction first.*

5. *All experimental boards or equipment should be fused properly.*

6. *Make sure all electrical devices are grounded properly.*

7. *Make sure any electrical component is discharged before touching (Capacitors and Condensers).*

8. *When working with an electrical probe, keep one hand in your pocket or behind your back so that you will not touch a ground wire and complete the circuit.*

9. *Wear gloves and face protection when handling Cathode-Ray tubes. WARNING Cathode-Ray tubes are an extreme explosion hazard.*

SAFETY IN SPECIAL ATTENTION AREAS

TRANSPORTATION

1. *Wear eye protection, see TECHNICAL REFERENCE MATERIAL.*
2. *Wait for a device to cool before making adjustments.*
3. *Make sure access doors or hoods are secured in the open position before making any adjustments on a vehicle.*
4. *When starting a device, make sure all unauthorized personnel are clear of the device and that all tools, equipment, and flammable materials have been removed from the area.*
5. *Do not weld, braze, or solder on a vehicle until the instructor has checked you out.*
6. *Wear a respirator (See TECHNICAL REFERENCE MATERIAL) while spray painting or abrading materials such as fiberglass.*
7. *Do not clean hands in gasoline or solvent. These types of materials are explosive and may cause skin irritation.*
8. *Lift heavy objects properly to avoid strain.*
9. *Never place any part of your body in front of a high pressure grease gun or air hose.*
10. *Never aim an air hose at another student.*
11. *Do not jack up a vehicle if someone is under it. Once the vehicle is jacked up use permanent jack stands.*
12. *Do not shake or climb on a jacked up vehicle.*
13. *Avoid long jack handles.*
14. *Do not use a bumper jack to raise a vehicle.*
15. *Do not run a vehicle on a hoist.*
16. *Clean up all spills immediately and ventilate.*
17. *Use only approved solvents for leaning parts - Do not use gasoline.*
18. *Keep oil-soaked rags, etc. in an approved container.*
19. *When "Jump Starting" a battery, make the second connection of the jumper cable on the frame of the vehicle NOT on the battery terminal.*

SAFETY IN SPECIAL ATTENTION AREAS

GRAPHICS

1. *The paper cutter used in most drafting rooms could be responsible for serious cuts or pinches. It is advisable to have it fastened in a permanent location and when it is not being used the arm should be locked in position. A barrier type guard secured to the cutter should be no higher than 3/8" from the table, and located between the operators hands and the blade.*

2. *Printers and developers using ammonia, call for special protection. Ammonia fumes in concentrated form are very toxic and should be used only in a well-ventilated area. DO NOT inhale the fumes. If spilled on your skin, wash off immediately with soap and water.*

3. *Improper use of the compass, dividers, and pencil leads can result in painful skin punctures or eye injuries, which in turn can lead to infection or blood poisoning.*

SAFETY IN SPECIAL ATTENTION AREAS

STORAGE BATTERIES

The storage battery that you are most likely to come in contact with is the automotive battery. Because of its size and the fact that it is so common, sometimes we tend to become careless.

The following are some rules of caution:

1. *Batteries should be stored and charged only in well-ventilated areas. Do not breathe fumes of battery acid.*

2. *All sources of ignition should be remote from the battery storage area; i.e., no smoking, no lighted matches, no sparking from tools.*

3. *Do not work on batteries while on charge or discharge.*

4. *Proper protective clothing should be worn when handling batteries; i.e., rubber gloves, face shield, and apron.*

5. *Deluge showers and eye baths should be provided ADJACENT to the battery charging area.*

6. *Acid spills can be neutralized with weak ammonia solution or bicarbonate of soda solution, or diluted with large quantities of water applied immediately.*

7. *Battery chargers should be connected or disconnected only when the unit is OFF and the caps are in place.*

SAFETY IN SPECIAL ATTENTION AREAS

GRAPHICS ARTS

DARK ROOM

1. *Turn on the ventilator fan when in the dark room.*
2. *Chemicals should not be stored in glass bottles or on high shelves where they can fall and cause injury.*
3. *Where chemical goggles and apron when preparing chemical solutions. ALWAYS add acid to water not water to acid.*
4. *Use rubber gloves when mixing chemicals.*

PLATE MAKER

1. *Disconnect the plate maker before changing carbons or making adjustments. Be careful of hot carbons.*
2. *Never look at the arc lights during operation.*
3. *Be careful not to break the glass of the vacuum frame.*

SAFETY IN SPECIAL ATTENTION AREAS

FINISHING ROOM

1. *Wear eye protection when pouring finishing liquids and solvents. See TECHNICAL REFERENCE MATERIAL.*
2. *Know the location of the fire extinguisher and how to operate it. See TECHNICAL REFERENCE MATERIAL.*
3. *Return all finishing materials to metal containers and cabinets.*
4. *Place all solvent, stain, or finish rags in an approved metal container. Dispose of them on a regular basis.*
5. *Be sure to have proper lens covers on the lights in your spray booth.*
6. *Keep the filters changed periodically in your spray booth, do not allow a material build-up.*
7. *Do not shake a can by hand in order to mix the contents. Take the lid off and stir properly.*
8. *Always treat the spray gun with caution and do not point it at anybody, only at the activity you are coating.*
9. *Wear a respirator when spraying. See TECHNICAL REFERENCE MATERIAL.*
10. *Use the proper pressure for the type of material and gun you are using.*
11. *Be certain the air hose is sound and free of cuts or pin holes.*
12. *Keep portable lamps out of the area during spraying.*
13. *The ventilation rate must be at least 100 linear feet per/minute over the open face of the booth.*
14. *Electric motors for the exhaust fans must be outside the booth or ducts.*

SAFETY IN SPECIAL ATTENTION AREAS

PLASTICS

1. *Wear eye protection, see TECHNICAL REFERENCE MATERIAL.*
2. *Never inter-mix anything unless you understand the reactions which take place.*
3. *Use proper ventilation, as toxic vapors may be given off.*
4. *Wear plastic gloves or other protective clothing to help guard against skin irritation.*
5. *Wear protective gloves for handling hot plastics.*
6. *Use face protection and an appropriate respirator when sanding fiberglass.*
7. *Keep materials with low flash points under refrigeration.*
8. *Keep all guards in place when operating any plastic machine.*
9. *Use warning signs or devices at each plastic heating unit.*
10. *Use only recommended materials and procedures for injection mold forming.*
11. *Properly dispose of all flammable waste materials.*
12. *Certain catalytic reactions produce a great deal of heat. They should be mixed in metal containers only.*
13. *Always add catalyst to resin - Never resin to catalyst.*

SAFETY IN SPECIAL ATTENTION AREAS

POLYSTYRENE EXPANDABLE BEAD FORMING

The following precautions should be taken when polystyrene expandable bead forming:

1. *Work in a well-ventilated area. The bead storage container will give off volatile fumes when opened. These fumes are formed during storage.*
2. *Work on a heat-resistant surface.*
3. *Wear safety glasses and heat-resistant gloves.*
4. *Keep a general purpose fire extinguisher in the work area.*
5. *Do not touch the hot molds, water container, or equipment with your bare hands.*
6. *Do not burn yourself with the hot air gun.*
7. *Do not burn yourself on the hot water or steam made during the foaming process.*
8. *Be sure to use polystyrene expandable bead foam plastic according to the manufacturer's instructions.*
9. *Learn the safe operation of the hot plate.*

FACILITY PLANNING

15.00

FACILITY PLANNING

One of the best ways to provide good safety in our vocational/technical labs is to have safe machines, safe tools, safe environment which comes about through good facility planning and management. Every instructor, therefore, at some time in his/her career, will be faced with the task of writing specification for equipment and developing floor plans. The following factors are normally considered by the planner, in this case the instructor:

1. *Flow of Material*
2. *Flow of Students*
3. *Tool and Equipment Arrangement*
4. *Electrical and other Utilities*
5. *Dust Collection*
6. *Color Coding*
7. *Lighting*
8. *Storage*
9. *Costs*
10. *Ventilation*
11. *Noise*
12. *Tool & Equipment Specifications*
13. *Personal Protective Equipment*

A good mental safety check might be to ask, "Is it Safe?" Then add the phrase "Pertinent to that particular plan consideration, or tool operation":

1. *Is it safe concerning the flow of materials?*
2. *Is it safe concerning the flow of students?*
3. *Is it safe concerning the operator?*
4. *Is it safe concerning nearby operations?*
5. *Is it mechanically safe?*
6. *Is it safe for inexperienced operators?*
7. *Does ventilation and color contribute to safety?*
8. *Is it satisfactorily guarded?*

SPACE PROVISIONS

The following space recommendation table is from the 1974 Guide to Preparing Educational Specifications For Secondary Industrial Arts Facilities, published by The American Council of Industrial Arts Supervisors.

RECOMMENDATIONS FOR TRADITIONAL VOCATIONAL/TECHNICAL COURSES

	Minimum	Adequate	Desired
General	80	100	125
Crafts	75	100	125
Metals	75	100	125
Drafting	40	50	60
Ceramics	60	70	80
Electricity	60	70	80
Woods	80	100	125
Power Mechanics	75	80	100
Plastics	60	70	80
Graphic Arts	75	80	100

Figures in square foot per student

NOISE PROVISIONS

Some labs produce noise at higher levels than others, as do individual machining processes. This level, in conjunction with the time involved, must be kept below permissible OSHA sound levels.

NOISE LIMITATIONS

Duration Per Day Hours	*Sound Level dba*
8	*90*
8	*92*
4	*95*
3	*97*
2	*100*
1 1/2	*102*
1	*105*
1/2	*110*
1/4 or less	*115*

Personal protection such as ear plugs or ear muffs are necessary when the noise level and the time exposure exceed OSHA standards. If a normal speaking voice cannot be understood from two feet away, the noise level is probably excessive. Reference page 16.02.

DUST

Control or collection of dust is necessary, particularly in the woods area. This can be accomplished by the installation of a dust collection system or by individual dust collectors on individual tools. Also, the amount of fresh air circulated in a given time period will provide added protection and a healthier environment.

One source gives the following guideline for air movement at the point of generation of a contaminant as follows:

Range of Capture Velocity	*Example Application*	*Capture Velocity*
Released with N Velocity into quieter air	*Evaporating from Tanks-Plating*	*50-100 FPM*
Released at low Velocity into moderate still air (Slight)	*Spray Booths Welding*	*100-200 FPM*
Active Generation into zone or rapid air motion (Moderate)	*Spray Painting Shallow Booths*	*200-500 FPM*
Released at high initial Velocity into a zone of very rapid air motion (Strong)	*Grinding Abrasive Blasting*	*500 - 2000 FPM*

As a rule of thumb for all labs there should be a complete air change every ten minutes - six times per hour - for adequate ventilation.

FACILITY PLANNING

GENERALLY ACCEPTED STANDARDS OR PRACTICES

AISLES

Walkways or aisles should be a minimum of three feet, preferably four feet.

MACHINES - EQUIPMENT

All equipment should be purchased which is adequately build and guarded with recognized safety standards and state requirements. Before accepting a new machine check it out to be sure it meets your specifications, based on the above.

LIGHTING

Lab areas require 70 foot candles, drafting areas require 100 foot candles.

STORAGE

Additional ventilation is needed for bulk storage of compressed gas. At least 20 feet of space or a fire barrier is required between stored oxygen and tanks.

COLOR

In selecting colors, select those which create a pleasant work area and reduce glare. Light pastels are recommended for walls and ceilings. Most equipment color selection would follow this basic ASA, ZR53 color system.

Basic Unit	*- Grey or Green*
Parts which might cut, crush, or shock	*- Orange*

Parts which move or project (Warn)	*- Yellow, or yellow and black stripes*
Stop Buttons	*- Red*
Repair	*- Blue*
Fire Items	*- Red*
First-Aid	*- Green and White*

SIGNS

Before you select a sign determine what you want it to do. Signs can do such things as:

1. *Warn of dangerous situations.*
2. *Give instructions.*
3. *Point out the location of something.*

Signs can help provide a safe and healthful working laboratory when you use the right sign for the right job.

Signs should be short and descriptive so they can be quickly and easily understood. The heading and the color of a sign help determine its effectiveness. These headings have been standardized by the OSHA code. Examples of them are listed on the next page.

Signs that warn of real or potential hazards must be visible to all persons and promptly removed or covered when the hazard no longer exists. Signs should be posted for maximum visibility, usually at eye level. Reference examples on pages 16.04, 05.

OSHA STATUTE/SUBJECT	IDENTIFICATION REQUIREMENT
FIRE CONTROL	
1910.157 PORTABLE FIRE EXTINGUISHERS	LOCATION OF EXTINGUISHERS SHALL BE CONSPICUOUSLY MARKED.
1910.157 (3) FIRE EXTINGUISHERS	DIRECTIONS TO NEAREST FIRE EXTINGUISHER MUST BE MARKED.
1910.158 (B) FIRE HOSE	FIRE HOSE MUST BE MARKED.
1910.38 FIRE EXIT	FIRE DOOR MUST BE MARKED TO INSURE CLEAR PATH.
1910.157 PORTABLE FIRE EXTINGUISHERS	MAINTENANCE AND RECHARGE DATE TAGS FOR FIRE EXTINGUISHERS
MISCELLANEOUS	
1910.25 LADDERS	DEFECTIVE LADDERS MUST BE TAGGED "DO NOT USE"
1910.94 VENTILATION	MARKING RESPIRATOR STORAGE COMPARTMENTS.
1910.142 IDENTIFY TOILET FACILITIES	DISTINCTLY MARK "MEN", "WOMEN".
1910.145 STANDARDS FOR ACCIDENT PREVENTION SIGNS	VARIOUS AND MISCELLANEOUS FOR DANGER, CAUTION, AND NOTICE MARKING.
1910.145 ACCIDENT PREVENTION TAGS	TEMPORARY WARNINGS OF HAZARDOUS CONDITIONS
ELECTROMECHANICAL	
1910.308 ELECTRICAL STANDARDS	ENTRANCE TO ROOM ATTENDING EXPOSED ELECTRICAL PARTS SHALL BE MARKED.
1910.308 ELECTRICAL STANDARDS	POST TEMPORARY LOCKOUT TAG ON SWITCHES AND EQUIPMENT TO BE CLOSED DOWN WHILE UNDERGOING REPAIR.
1910.308 ELECTRICAL STANDARDS	IDENTIFY SWITCH BOXES AND SWITCHES WITH VOLTAGE; IDENTIFY "DANGER HIGH VOLTAGE" LEADS, DISCONNECTS, BOXES.

OSHA STATUTE/SUBJECT	IDENTIFICATION REQUIREMENT
EXITS AND ENTRANCES	
1910.36 (5) EXIT MARKING	IDENTIFY EXITS.
1910.36 (5) NO EXIT MARKING	IDENTIFY DOORS WHICH ARE NOT EXITS.
1910.37 (q) DIRECTION ARROWS	SIGNS AND ARROWS INDICATING THE PATH.
1910.68 (7) VISITOR WARNING	"AUTHORIZED PERSONNEL ONLY"
STORAGE	
1910.109 EXPLOSIVES/PROPERTY MARKING	SIGN -- "EXPLOSIVES -- KEEP OFF"
1910.1000 TO 1910.1017 TOXIC AND HAZARDOUS SUBSTANCES	POSTING OF WARNING SIGNS AND LABELING OF HAZARDOUS MATERIALS
1910.106 FLAMMABLE AND COMBUSTIBLE LIQUIDS STORAGE	MARK CABINET "FLAMMABLE -- KEEP FIRE AWAY"
1910.106 FLAMMABLE AND COMBUSTIBLE LIQUIDS STORAGE	SIGN IN STORAGE LOCATION -- "DANGER NO SMOKING"

MACHINE GUARDING

MACHINE GUARDING

The machinery in our labs creates potential hazards since there exists movement and motion of all types.

People, operators, cannot always be relied upon to act safely enough around machinery that is in motion to avoid accidents.

Machine guarding falls into two important guarding classifications: Point-Of-Operation Guarding and Power Transmission Guarding.

Point-of-operation guarding is intended primarily to protect the operator during machining operations in and around the point at which the stock comes into contact with the material. Examples of point-of-operation guarding would include the following: drill bits, blades, cutters, knives, etc.

Power transmission guarding protects the operator during the machining operation and also while the machine is running but without material contact. Examples of power transmission guarding would include the following: gears, cams, belts, pulleys, chains, etc.

The OSHA Standards relate specifically to the above types of guarding. For more specific explanation refer to the OSHA 1910.211, which is found in Subpart O of the volume. Reference page 16.10.

MACHINE GUARDING

GENERAL REQUIREMENTS

1. *One or more methods of machine guarding must be provided to protect the operator and others in the machine area from hazards.*
2. *Guards must be attached to the machine if possible.*
3. *The guard itself should not be a hazard.*
4. *The guarding device must conform to appropriate standards, or, if no standard exists, be designed and made to prevent the operator from having any part of his/her body in the danger zone during the operating cycle.*
5. *All belts, pulleys, chains, sprockets, and gears must be effectively guarded.*
6. *V-belts and chain drives must be completely enclosed.*
7. *Carry molten metal as close to the floor as possible using a two-man pouring tool.*

CONSIDERATIONS WHEN SELECTING GUARDING METHODS

1. *Type of operation*
2. *Size or shape of stock*
3. *The method of handling*
4. *The physical layout*
5. *The type of material*
6. *Job requirements or limitations*
7. *Flexibility in operations*

METHODS OF GUARDING

Enclosure Guards

Fixed enclosure quards are preferred to all other types.

(Purpose)

A. *Prevent access to dangerous parts at all times by enclosing the hazard completely.*

B. *Also restrain bursting machine parts from flying about.*

C. They admit the stock but will not admit the hands into the danger zone because of limited feed opening size.

Fixed enclosure guards may also be adjustable, but once adjusted, they should be fixed.

(Usage)

A. Point at which material is being processed.

B. Other places where there may be a hazard when inserting or manipulating stock.

C. To prevent contact with rotating, reciprocating, and transverse motion of machine members away from the point of operation.

Interlocking Guards

Used when a fixed enclosure guard is not practical.

(Purpose)

A. Provides that the operation position and the operator can no longer reach the point of danger.

(Usage)

A. This type of guard quickly stops the machine or prevents application of injurious pressure when any part of the operator's body contacts the barrier.

The barrier may be a bar, a rod, a wire or in the form of an electric eye beam or a magnetic, radiation, or similar type of circuit.

Automatic Guards

Used when neither an enclosure nor interlocking guard is practical.

(Purpose)

A. Acts independently of the operator, repeating its cycle as long as the machine is in motion.

(Usage)

A. Sweep and push-away devices prevent the operator from reaching behind or across the protective device into the danger zone before the machine has completed its closing cycle.

Remote Control, Placement, Feeding, Ejecting

Although they are not guards in the technical sense, there are certain methods which can be used to accomplish the same effect.

They may be used to complement one of the other types of guards.

Examples: Two-hand trip devices.

Hazard-Creating Motion or action

1. *Cutting action (Circular saws, milling machines, etc.*
2. *Rotating, reciprocating, and transverse motion (collars, couplings, cams, clutches, flywheels, etc.*
3. *In running nip points (rolls, calendars, etc.)*
4. *Punching, shearing, and bending action (bending presses, brakes, alligator shears, etc.)*

Note: A list of machine guard fabricators is given on page 17.09.

TECHNICAL REFERENCE MATERIAL

17.00

RESPIRATOR PROTECTION GUIDELINE

Respirator protection should be carefully selected for each specific application, and should not be worn in atmospheres immediately dangerous to life or health, or in atmospheres containing less than 19.5% oxygen. Wearer shall be fitted according to the instructions supplied by the manufacturer, and respirators maintained accordingly.

WORK AREA	HAZARD	NIOSH CERTIFICATION		RESPIRATOR TYPE
WOOD WORKING	NUISANCE DUST	TC-21C DISPOSABLE		APPROVED FOR PNEUMONCONIOSIS AND BIBROSIS DUSTS
METAL GRINDING CERAMIC POLISHING	NUISANCE AND TOXIC DUSTS	TC-21C TYPE WITH DUST REPLACEABLE FILTER		APPROVED FOR DUSTS AND MIST
SPRAY PAINTING	ORGANIC VAPORS PAINT SPRAYS PARTICULATES	TC-23C CHEMICAL CARTRIDGE AND REPLACEABLE FILTER COMBINATION		APPROVED FOR ORGANIC VAPORS, DUSTS, MIST, PAINT, LACQUER AND ENAMEL MIST
PRINT SHOP	ORGANIC VAPORS AND TOXIC	TC-23C CHEMICAL CARTRIDGE AND REPLACEABLE FILTER COMBINATION		APPROVED FOR ORGANIC VAPORS AND/OR DUSTS MISTS
DRAFTING	AMMONIA VAPORS	TC-23C CHEMICAL CHEMICAL CARTRIDGE TYPE		APPROVED FOR AMMONIA VAPORS
JEWELRY ETCHING AND CLEANING	ACID GASES METAL FUMES	TC-23C CHEMICAL CARTRIDGE COMBINATION TYPE		APPROVED FOR ACID GASES OR METAL FUMES
MELT SHOPS WELDING SHOPS	BRASS, IRON, AND OTHER METAL FUMES AGENTS	TC-21C REPLACEABLE DUST-MIST-FUME FILTER		APPROVED FOR METAL FUMES
AGRICULTURE	PRESTICIDES	TC-23C CHEMICAL CARTRIDGE AND REPLACEABLE FILTER COMBINATION		APPROVED FOR PESTICIDES

TECHNICAL REFERENCE MATERIAL

CHART OF SELECTED NOISE LEVEL EXAMPLES

Noise Level	Example	Risk
Sound Level Decibels	Audiometric Testing Booth	
20	Threshold of Hearing	None
20	Studio for Sound Pictures	Very Low
40	Library	Quiet
75	AC Arc Welder	
75	Inside Sports Car (50 mph)	Loud
78	Milling Machine	
79	Bench Grinder 175mm (7")	
79	AC/DC Arc Welder	
82	Abrasive Blaster	
90	Portable Sander	Risk
90	Anvil	
94	Foot Squaring Shear	
95	Crucible Furnace	
96	Abrasive Saw 250mm (10")	
100	Can Manufacturing Plant Portable Grinders	
105	Riveting Machines Rock and Roll Band Circular Saw	Very Loud
110	Drills, Steam Shovels, Trucks, Operating	
112	Sand Blasting	
- 120 -	- THRESHOLD OF PAIN -	- DANGER RANGE -
130	Riveting Steel Tank	
150	Jet Engine Test Cell	Uncomfortable Loud
180	Rocket Launching Pad	

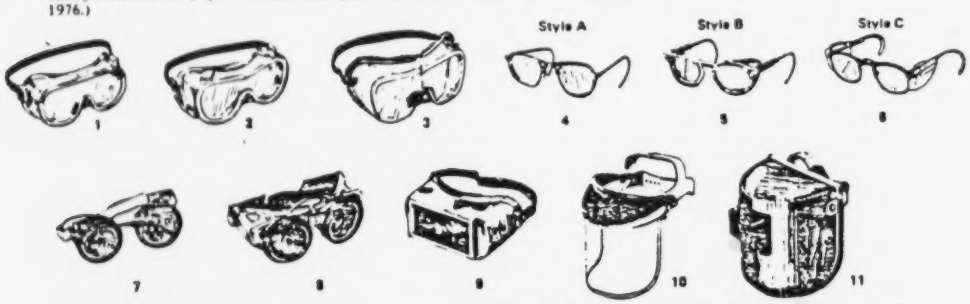
If you do not have a Type 2A Sound Level Meter, contact a local industrial concern or safety engineers group for assistance.

EYE AND FACE PROTECTORS

AMERICAN NATIONAL STANDARD Z87.1-1979

Selection Chart for Eye and Face Protectors for Use in Industry, Schools, and Colleges

This Selection Chart offers general recommendations only. Final selection of eye and face protective devices is the responsibility of management and safety specialists. (For laser protection, refer to American National Standard for Safe Use of Lasers, ANSI Z136.1-1976.)



1. GOGGLES, Flexible Fitting, Regular Ventilation
2. GOGGLES, Flexible Fitting, Hooded Ventilation
3. GOGGLES, Cushioned Fitting, Rigid Body
*4. SPECTACLES, without Sideshields
5. SPECTACLES, Eyecup Type Sideshields
6. SPECTACLES, Semi-/Flat-Fold Sideshields
**7. WELDING GOGGLES, Eyecup Type, Tinted Lenses (Illustrated)
7A. CHIPPING GOGGLES, Eyecup Type, Clear Safety Lenses (Not Illustrated)
**8. WELDING GOGGLES, Coverspec Type, Tinted Lenses (Illustrated)
8A. CHIPPING GOGGLES, Coverspec Type, Clear Safety Lenses (Not Illustrated)
**9. WELDING GOGGLES, Coverspec Type, Tinted Plate Lens
10. FACE SHIELD, Plastic or Mesh Window (see caution note)
* 11. WELDING HELMET

*Non-sideshield spectacles are available for limited hazard use requiring only frontal protection.
**See Table A1, "Selection of Shade Numbers for Welding Filters," in Section A2 of the Appendix.

APPLICATIONS		
OPERATION	HAZARDS	PROTECTORS
ACETYLENE–BURNING ACETYLENE–CUTTING ACETYLENE–WELDING	SPARKS, HARMFUL RAYS, MOLTEN METAL, FLYING PARTICLES	7, 8, 9
CHEMICAL HANDLING	SPLASH, ACID BURNS, FUMES	2 (For severe exposure add 10)
CHIPPING	FLYING PARTICLES	1, 3, 4, 5, 6, 7A, 8A
ELECTRIC (ARC) WELDING	SPARKS, INTENSE RAYS, MOLTEN METAL	11 (In combination with 4, 5, 6, in tinted lenses, advisable)
FURNACE OPERATIONS	GLARE, HEAT, MOLTEN METAL	7, 8, 9 (For severe exposure add 10)
GRINDING–LIGHT	FLYING PARTICLES	1, 3, 5, 6 (For severe exposure add 10)
GRINDING–HEAVY	FLYING PARTICLES	1, 3, 7A, 8A (For severe exposure add 10)
LABORATORY	CHEMICAL SPLASH, GLASS BREAKAGE	2 (10 when in combination with 5, 6)
MACHINING	FLYING PARTICLES	1, 3, 5, 6 (For severe exposure add 10)
MOLTEN METALS	HEAT, GLARE, SPARKS, SPLASH	7, 8 (10 in combination with 5, 6, in tinted lenses)
SPOT WELDING	FLYING PARTICLES, SPARKS	1, 3, 4, 5, 6 (Tinted lenses advisable; for severe exposure add 10)

CAUTION:
- Face shields alone do not provide adequate protection.
- Plastic lenses are advised for protection against molten metal splash.
- Contact lenses, of themselves, do not provide eye protection in the industrial sense and shall not be worn in a hazardous environment without appropriate covering safety eyewear.

Fig. 8
Selection Chart

SAFETY SIGN GUIDE

DANGER — White letters on red oval surrounded by a rectangular black field. "Danger signs should be used only where an immediate hazard exists. There shall be no variation in the type of design of signs posted to warn of specific dangers and radiation hazards." OSHA 1910.145

NOTICE — White letters on blue field. "Blue shall be the standard color for informational signs. It may be used as the background color for the complete signs or as a panel at the top of such 'Notice' signs which have a white background." OSHA 1910.145

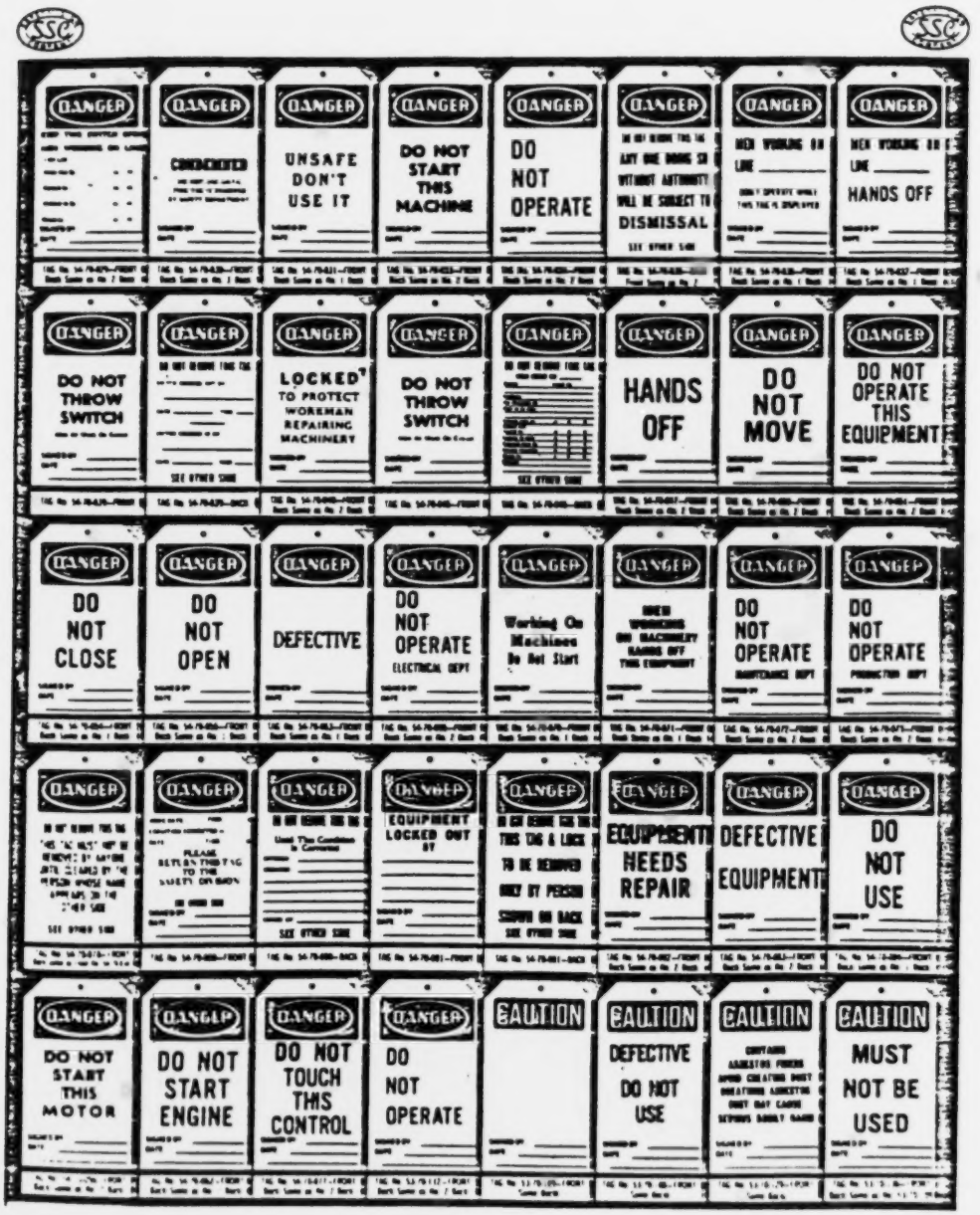
SAFETY FIRST — White letters on green field. "Safety instruction signs shall be used where there is a need for general instructions and suggestions relative to safety measures." OSHA 1910.145

CAUTION — Yellow letters on black field. "Caution signs shall be used only to warn against potential hazards or to caution against unsafe practices." OSHA 1910.145

BE CAREFUL — White letters on green field. A safety reminder advising your personnel re: hazards and safety practices.

THINK — White letters on green field. Helps remind personnel to stay alert.

DANGER TAGS


DANGER
CONDEMNED
UNSAFE DON'T USE IT
DO NOT START THIS MACHINE
DO NOT OPERATE
MEN WORKING ON LINE
HANDS OFF
DO NOT THROW SWITCH
LOCKED TO PROTECT WORKMAN REPAIRING MACHINERY
HANDS OFF
DO NOT MOVE
DO NOT OPERATE THIS EQUIPMENT
DO NOT CLOSE
DO NOT OPEN
DEFECTIVE
DO NOT OPERATE
Working On Machines Do Not Start
DO NOT OPERATE
DO NOT OPERATE
EQUIPMENT LOCKED OUT BY
EQUIPMENT NEEDS REPAIR
DEFECTIVE EQUIPMENT
DO NOT USE
DO NOT START THIS MOTOR
DO NOT START ENGINE
DO NOT TOUCH THIS CONTROL
DO NOT OPERATE
CAUTION
DEFECTIVE DO NOT USE
CAUTION
CAUTION
MUST NOT BE USED

CHEMICAL LEGISLATION - 958 NEWEST REVISION

CHAPTER 22
TITLE 26 MAINE REVISED STATUTES ANNOTATED
1984 PUBLIC LAW, CHAPTER 823

§1709. Purpose

The purpose of this chapter is to ensure that the hazards of all chemicals produced or imported by chemical manufacturers or importers are evaluated, and that information concerning their hazards is transmitted to affected employers and employees and others in order to reduce the incidence of chemically-related illnesses and injuries. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training. Workers have a right to know about chemical hazards to which they may be exposed.

This chapter is intended to address comprehensively the issue of evaluating communicating chemical hazards to employees in the manufacturing and other designated sectors. This chapter is intended to be consistent with the Hazard Communication Rule promulgated by the United States Department of Labor, Occupational Safety and Health Administration, November 25, 1983, in order to reduce any burden on interstate commerce and to facilitate compliance. To the extent that Occupational Safety and Health Administration enforces the federal rule beginning in 1985-86, it is intended that there be no duplication of enforcement. This chapter goes beyond the Occupational Safety and Health Administration standard primarily in 3 ways: Certain parts are effective earlier; additional industries are addressed; and this chapter requires communication with health officials, not just employees.

§1710. Scope and application

1. Information. This chapter requires that information be provided to employees by the employer about the identities and hazards of chemicals in the work area by means of chemical identification lists, labels, material safety data sheets, education and training and access to written records.

2. Applicable chemicals. This chapter applies to any chemical in the work area which is a hazardous chemical, present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency, except as specifically provided in this chapter.

3. Nonapplicable chemicals. This chapter does not apply to chemicals which are: Hazardous waste when subject to regulations issued by the Department of Environmental Protection or the United States Environmental Protection Agency; tobacco or tobacco products; wood or wood products; articles; compressed air; and foods, drugs or cosmetics intended for personal consumption by employees while in the workplace.

The following substances are exempt from all requirements of this chapter:

A. Consumer products and foodstuffs packaged for distribution to, and intended for use by, the general public. This includes any labeled product used or stored in a workplace in the same form approximate volume or amount, concentration and manner as it is sold to and used by the general public, provided that it remains labeled in the workplace, and to which, in the employer's knowledge, employee exposure is not significantly different from that of the general public during foreseeable use of the substance;

B. Substances sold by retail stores, for personal or domestic consumption, which are prepackaged, sealed, canned or otherwise contained so as to prevent worker exposure;

C. Common substances found in the workplace in small quantities that do not present a significant hazard to workers. Common substances include, but are not limited to, office desk top supplies, such as correction fluid, thinner or typewriter cleaning fluid, glues and cleaning solvents;

D. Petroleum distillates used as motor fuel or heating fuel;

E. Fire extinguishers in the workplace; and

TECHNICAL REFERENCE MATERIAL

NOTE: ORIGINAL LEGISLATION 1-1-80

JOSEPH E. BRENNAN
GOVERNOR

STATE OF MAINE
DEPARTMENT OF MANPOWER AFFAIRS
BUREAU OF LABOR
STATE OFFICE BUILDING
AUGUSTA, MAINE 04333

DAVID W. BUSTIN
Commissioner

MARVIN EWING
Bureau Director

RE: CHEMICAL SUBSTANCE IDENTIFICATION

Legislative document 958 is being sent to you for your information and action if you use any of the identified chemicals in your plant or business. Please note that the effective date of this new safety and health legislation is January 1, 1980.

I am sure you are aware of substantial pending claims by the employees of several industries in the country alleging that their existing health problems are the result of past exposure(s) to certain chemicals or substances, and that they were not made aware of the potential hazards to their health. It is our belief that L. D. 958 will clearly benefit the employer as well as his employees.

Please advise this Bureau if we may be of any help to you in complying with the requirements of this new legislation.

Respectfully,

Marvin W. Ewing

Marvin W. Ewing
Director

MWE:djv

H. P. 750 — L. D. 958

AN ACT Relating to the Identification and the Hazards of Chemicals in the Work Area.

Be it enacted by the People of the State of Maine, as follows:

26 MRSA c. 22 is enacted to read:

CHAPTER 22

CHEMICAL SUBSTANCE IDENTIFICATION

§ 1701. Scope and application

1. Information. This chapter requires that information be provided to employees about the identities and hazards of chemicals in the work area by means of chemical identification lists, labels, substance data sheets, education and training and access to written records.

2. Applicable chemicals. This chapter applies to any chemical in the work area which is:

A. A hazardous substance;

B. A toxic substance; or

C. A substance likely to be inhaled, ingested or absorbed through the skin.

3. Nonapplicable chemicals. This chapter does not apply to chemicals which are goods, drugs, cosmetics or tobacco products intended for personal consumption.

§ 1702. Definitions

As used in this chapter, unless the context otherwise indicates, the following terms shall have the following meanings.

1. Chemical. "Chemical" means any element, chemical compound or mixture of elements or compounds, or both.

2. Chemical name. "Chemical name" means the name of a substance established by the Chemical Abstracts Services in the most recent edition of the Collective Index of Chemical Abstracts.

3. Common name. "Common name" means any designation or identification, such as code name or number or trade or brand name, used by the employer to identify a substance other than by its chemical name.

4. Container. "Container" means any open or closed bag, barrel, bottle, carton, flask, package, tank, vat, vessel or the like into which chemicals are placed.

5. Director. "Director" means the Director of the Bureau of Labor, Department of Manpower Affairs, or a designee.

6. Hazardous substance. "Hazardous substance" means a chemical which:

A. Is listed in the Department of Transportation Hazardous Materials Table, 49 CFR 172.101; and

B. Meets one or more of the following criteria for hazard class:

(1) Is a combustible substance. For purposes of this section, a combustible substance is any liquid with a flash point above 100°F. and below 200°F.;

(2) Is a compressed gas. For purposes of this section, a compressed gas is any chemical having in the container an absolute pressure exceeding 40 PSI at 70°F. or having an absolute pressure exceeding 104 PSI at 130°F., or any flammable liquid having a vapor pressure exceeding 40 PSI absolute pressure at 100°F.;

(3) Is an explosive. For purposes of this section, an explosive is any chemical which is capable of producing an instantaneous release of gas and heat;

(4) Is a flammable substance. For purposes of this section, a flammable substance is any liquid with a flash point of below 100°F., solid heat from manufacturing or processing or gas which at atmospheric temperature and pressure forms a flammable mixture with air when present at a concentration of 13% or less by volume or that forms a range of flammable mixtures with air wider than 12% regardless of the lower limit;

(5) Is an organic peroxide. For purposes of this section, an organic peroxide is an organic compound that contains the bivalent - 0 - 0 - structure and which is a derivative of hydrogen peroxide where one or more hydrogen atoms have been replaced by organic radicals; or

(6) Is an oxidizer. For purposes of this section, an oxidizer is a chemical that readily yields oxygen and can stimulate the combustion of organic matter.

7. Toxic substance. "Toxic substance" means a chemical which is:

A. Listed in the Toxic and Hazardous Substances section of the regulations of the Occupational Health and Safety Act labeling standard in the United States Code of Federal Regulations 29, Part 1910, Subpart Z.

8. Work area. "Work area" means a room or defined space in which employees are or may be exposed to chemicals.

§ 1703 Labels

1. Containers to be labeled, tagged or marked. Each container present in the work area shall be labeled, tagged or marked with the common or chemical names of the chemicals contained.

2. Label requirements of the Occupational Health and Safety Act. Each container of chemicals subject to a specific Occupational Health and Safety Act labeling standard in the United States Code of Federal Regulations 29, Part 1910, Subpart Z, or United States Code of Federal Regulations 29, Part 1990, shall meet the specific labeling requirements of that standard in lieu of the requirements of this paragraph.

3. Label of chemical containers sold or distributed. The chemical name

and any labels required by this standard shall be affixed to containers of chemicals which are sold, distributed or otherwise leave the employer's work area.

§ 1704. Employee education and training

1. Education and training program required. The employer shall institute an education and training program for all employees who are routinely exposed to hazardous or toxic chemicals.

2. Schedule for educational and training program. The education and training shall commence prior to initial assignment and shall be repeated at least annually thereafter. Additional instruction shall be provided whenever chemicals or processes change, or newly acquired information indicates the need for additional protective measures.

3. Education and training contents. The education and training program shall include the following:

A. The location, properties and acute and chronic health effects of the chemicals to which the employees are routinely exposed in the work area;

B. The nature of the operations which could result in exposure to these chemicals as well as any necessary handling or hygenic practices or precautions;

C. The purpose, proper use and limitation of personal protective equipment required by any other Occupational Health and Safety Act standard or otherwise used in the work area; and

D. An explanation of the information contained on the labels.

4. Materials furnished at no cost. The employer shall assure that all the education and training materials and information are provided at no cost to the employee.

5. Materials available at request to the director. All materials relating to education and training and required by this standard shall be made available upon request to the director.

§ 1705 Access to written records.

1. Lists and sheets; availability. Chemical identification lists and substance data sheets required by this chapter shall be made available upon request for examination and copying to any affected employee, former employee, designated physician or representative or the director. The chemical identification lists shall be kept for 20 years.

2. Exposure measurements; availability. Any exposure measurements taken to monitor employee exposure to chemicals in the work area shall be made available upon request for examination and copying to any affected employee, former employee, designated physician or representative or the director.

§ 1706. Effective date. This chapter shall become effective on January 1, 1980.

IMMUNITY FROM CIVIL LIABILITY

Notwithstanding any inconsistent provisions of any public or private and special law, any person who voluntarily, without the expectation of monetary or other compensation, renders first aid, emergency treatment or rescue assistance, shall not be liable for damages for injuries alleged to have been sustained by such person nor for damages for the death of such person alleged to have occurred by reason of an act of omission in the rendering of such first aid, emergency treatment or rescue assistance, unless it is established that such injuries or such death were caused willfully, wantonly or recklessly or by gross negligence on the part of such person. This section shall not be construed to require a person who is ill or injured to be administered first aid or emergency treatment if such person objects thereto on religious grounds. This section shall not apply if such first aid or emergency treatment or assistance is rendered on the premises of a hospital or clinic.

TECHNICAL REFERENCE MATERIAL

MACHINE GUARD FABRICATORS:

Atlantic Plastics & Supply, P. O. Box 14167, Raleigh, NC 27610

Bathead Products, One Washington Street, Dover, NH 03820 - Attn: Ms. Alice Monahan

Bodyguard, 5087 Westerville Road, Columbus, OH 43229

Comco Plastics, 55 Marine Street, Farmingdale, NY 11735

Comco Plastics, 98-31 Jamaica Avenue, Richmond Hill, NY 11418

Commercial Plastics and Supply Corporation, 220 Vantage, Dallas, TX 75207 - Attn: Mr. Tom Jones

Custom Plastics, Inc., P. O. Box 18517, Charlotte, NC 28218

Dayton Plastics, Inc., 2554 Needmore Road, Dayton, OH 45414

Fabco, Inc., 1733 Arlington Road, Richmond, Virginia 23230

FCI, 4661 Giles Road, Cleveland, Ohio 44135

Formall Plastics, P. O. Box 5702, Knoxville, TN 37918

Gemini, Inc., 103 Mensing Way, Cannon Falls, MN 55009 - Attn: Ms. Jennie Johnson

Hillcor Plastics, 11730 Willake, Santa Fe Springs, CA 90670 - Attn: Mr. Harry Hill

Malson Plastics, 740 Clementine, San Francisco, CA 94103

Newhart Products, Inc., 80 Collingsdale Drive, Milford, CT 06460 - Attn: Ms. Doris Ansoro

Orbit Plastics Corporation, 35 Congress Street, Salem MA 01970 - Attn: Mr. Fred Jackson

Polysynthetics Company, 1602 Manning Boulevard, Levittown, PA 19057

Piedmont Plastics, Inc., 3653 Interstate 85, North, Charlotte NC 28206 (P. O. Box 26006, Zip 28213)

Profile Plastics Corporation, 1840 Janke Drive, Northbrook, IL 60062

Production Plastics, 315 Garfield Street, McMinnville, TN 37110

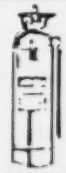
Regal Plastic Supply Company, 3985 South Kalamath Street, Englewood, CO 80110

Regal Plastics, Inc., 800 Overhead Drive, Oklahoma City, OK 73128 - Attn: Mr. Bob Brackenbury

Toolmark Company, 6840 Shingle Creek Parkway, Minneapolis, MN 55430

Webb Plastics, Inc., 2820 Old Willow Road, Northbrook, IL 60062

Zero Manufacturing Co., 299 Main Street, Monson, MA 01057 - Attn: Mr. Dave Marean

	WATER TYPE				FOAM	CARBON DIOXIDE	DRY CHEMICAL			
							SODIUM OR POTASSIUM BICARBONATE		MULTI-PURPOSE ABC	
	STORED PRESSURE	 CARTRIDGE OPERATED	WATER PUMP TANK	SODA ACID	FOAM	CO 2	CARTRIDGE OPERATED	STORED PRESSURE	STORED PRESSURE	CARTRIDGE OPERATED
CLASS A FIRES — WOOD PAPER TRASH HAVING GLOWING EMBERS	YES	OBSOLETE — UPDATE YOUR FIRE EXTINGUISHING CAPABILITY — ASK FOR TRADE IN UPDATE PRICE	YES	OBSOLETE — UPDATE YOUR FIRE EXTINGUISHING CAPABILITY — ASK FOR TRADE IN UPDATE PRICE	OBSOLETE — UPDATE YOUR FIRE EXTINGUISHING CAPABILITY — ASK FOR TRADE IN UPDATE PRICE	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	NO (BUT WILL CONTROL SMALL SURFACE FIRES)	YES	YES
CLASS B FIRES — FLAMMABLE LIQUIDS GASOLINE OIL PAINTS GREASE ETC	NO		NO			YES	YES	YES	YES	YES
CLASS C FIRES — ELECTRICAL EQUIPMENT	NO		NO			YES	YES	YES	YES	YES
CLASS D FIRES — COMBUSTIBLE METALS	SPECIAL EXTINGUISHING AGENTS APPROVED BY RECOGNIZED TESTING LABORATORIES									
METHOD OF OPERATION	PULL PIN-SQUEEZE HANDLE	OBSOLETE — UPDATE YOUR FIRE EXTINGUISHING CAPABILITY — ASK FOR TRADE IN UPDATE PRICE	PUMP HANDLE	OBSOLETE — UPDATE YOUR FIRE EXTINGUISHING CAPABILITY — ASK FOR TRADE IN UPDATE PRICE	OBSOLETE — UPDATE YOUR FIRE EXTINGUISHING CAPABILITY — ASK FOR TRADE IN UPDATE PRICE	PULL PIN-SQUEEZE LEVER	RUPTURE CARTRIDGE-SQUEEZE LEVER	PULL PIN SQUEEZE HANDLE	PULL PIN-SQUEEZE HANDLE	RUPTURE CARTRIDGE-SQUEEZE LEVER
RANGE	30' - 40'		30' - 40'			3' - 8'	5' - 20'	5' - 20'	5' - 20'	5' - 20'
MAINTENANCE	CHECK AIR PRESSURE GAUGE MONTHLY		DISCHARGE AND FILL WITH WATER ANNUALLY			WEIGH SEMI-ANNUALLY	WEIGH GAS CARTRIDGE-CHECK CONDITION OF DRY CHEMICAL ANNUALLY	CHECK PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	CHECK PRESSURE GAUGE AND CONDITION OF DRY CHEMICAL ANNUALLY	WEIGH GAS CARTRIDGE CHECK CONDITION OF DRY CHEMICAL ANNUALLY

NOTES: Class D Fires - In hot metal areas which may utilize magnesium, titanium, zirconium & sodium must provide Type D extinguishers or D rated chemical available for use on metal fires.

SAFETY STANDARD REFERENCES
(OSHA - 1910)
(ANSI)

OSHA - Area Office:

Room 121, Federal Building
Western Avenue
Augusta, ME 04330

(Machine Guarding) 1910.211, 212

Woods - 1910.213
Cooperage - 1910.214
Abrasive Wheel Machinery - 1910.215
Mills - Plastics - 1910.216
Mechanical Power Presses - 1910.217
Forging - 1910.218
Mechanical Power Transmission - 1910.219

(Portable Power Tools) 1910.241 - 244

(Welding - Cutting - Brazing) 1910.252

(Compressed Gas - Compressed Air) 1910.166 - 169

(Toxic & Hazardous Substances) 1910.1000 - 1046

(Personal Protective Equipment) 1910.132

Eyes - 133
Respiratory - 134
Head - 135
Foot - 136

(Environmental Control) 1910.94-97

Ventilation
Noise

(Means of Egress) 1910.36-37

(Walking - Working Surfaces)

Floor Load - 22
Railings - 23
Ladders - 27
Stairs - 24, 25, 26, 28, 1926.451
Scaffolding - 28, 1926.451

(Electrical Controls) *N.E.C.*

(General Environmental Control) *1910.141*

Color Coding - 144
Signs - 145

(Medical - First Aid) *1910.151*

(Fire Protection) *1910.156*

Portable Fire Extinguishers - 157

ANSI - Regional Office:

1430 Broadway
New York, NY 10018
(212) 354-3300

Eyes - ANSI Z 87.1
Respiratory - ANSI Z 88.1
Head - ANSI Z 89.1
Foot - ANSI Z 41.1

HAZARDOUS MATERIALS INFORMATION SHEET

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
ADDRESS *(Number, Street, City, State, and ZIP Code)*	
CHEMICAL NAME AND SYNONYMS	TRADE NAME AND SYNONYMS
CHEMICAL FAMILY	FORMULA

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER			
APPEARANCE AND ODOR			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel

EXTINGUISHING MEDIA
SPECIAL FIRE FIGHTING PROCEDURES
UNUSUAL FIRE AND EXPLOSION HAZARDS

PAGE (1)

(Continued on reverse side)

Form OSHA-20
Rev. May 72

MAINE REVISED STATUTES ANNOTATED - TITLE 20-A - STATE OF MAINE LAWS RELATING TO PUBLIC SCHOOLS, CHAPTER 125

125.17 SCHOOL HEALTH SERVICES AND SAFETY PROCEDURES

A. School Health Services

Each school unit shall establish school health services which meet all applicable statutory requirements and rules of the Department and the Department of Human Services.

No child shall be enrolled or allowed to remain in school who is not in compliance with provisions of the School Immunization Law, Title 20-A, sec. 6351, and rules of the Commissioner and the Department of Human Services.

Each child shall be screened by designated personnel for vision and hearing deficiencies in accordance with Title 20-A, sec. 6451, and rules of the Commissioner.

Children in grades 5-8 shall be screened for scoliosis in accordance with Title 20-A, sec. 6452, and rules of the Department of Human Services.

The school administrative unit shall inform the parent of a student suffering from a disease or defect in accordance with MRSA 20-A, sec. 6453.

Employees of the school unit shall comply with provisions of the Tuberculosis Testing Law, Title 20-A, sec. 6551, and rules of the Department of Human Services.

B. Emergency Procedures

Written procedures for fire drills shall be posted in all buildings. Fire drills shall be held ten times annually in accordance with the requirements of the Life Safety Code. Results shall be recorded and deficiencies noted and corrected. Staff members shall receive an annual orientation in this procedure.

Each school shall have immediate access to a telephone or other means of electronic communication. The numbers of local fire, police and emergency services shall be conspicuously posted on or near all telephones.

Each school shall have first-aid medical supplies available for the treatment of minor injuries.

Each school shall distribute to all staff members a written procedure governing the handling of serious health emergencies, including accidents. Staff members receive an orientation in this procedure.

C. Safety Procedures

Systematic procedures for the safe operation of all school equipment shall be established; appropriate instruction in the use of equipment shall be provided for staff. All equipment shall be periodically inspected according to a written safety procedure. Results shall be recorded and deficiencies noted and corrected.

Instruction in safety pertaining to all potentially dangerous activities conducted in school programs such as industrial arts, physical education, fine arts, and science laboratories shall be the duty of teachers assigned to the programs.

All persons shall war industrial quality eye protective devices which have been sanitized prior to use, when exposed to dangerous activities in:

(1) vocational and industrial shops or laboratories involving the use of hot molten metals; the milling, sawing, turning, grinding, cutting or stamping of any solid materials; the heat treatment, tempering or kiln firing of any metal or other materials, including gas or electric arc welding; the repairing or servicing of any vehicle; or the use of caustic or explosive materials.

(2) chemical or combined chemical-physical laboratory work, including the use of acid, caustic or explosive chemicals or hot liquids or solids.

Industrial quality eye protective devised shall meet the standards of the U.S.A. Standards Institute Safety Code for Head, Eye, and Respiratory Protection, Z87.1-1968, adopted by the U.S.A. Standards Institute.

COMMON SOLVENTS AND THEIR HAZARDS

COMMON SOLVENTS AND THEIR HAZARDS

	OSHA TLV	Proposed† TLV	Health Hazards	Fire/Explosion Hazard
ALCOHOLS				
ethanol (wood alcohol)	200 ppm		skin, *brain*, *liver*, *irritation*, causes blindness when ingested	high
ethanol	1000		*skin*, *brain*, *irritation*	high
n-propyl alcohol	200		*skin*, *brain*, *irritation*	high
isopropyl alcohol	400		*skin*, *brain*, *irritation*	high
isobutyl alcohol	100	50	skin, *brain*, irritation	high
isoamyl alcohol	100		skin, brain, irritation	moderate
ALIPHATIC HYDROCARBONS				
pentane(s)	1000	600	skin, *brain*	extreme
hexane(s)	500	100	skin, *brain*, peripheral nervous system	high
heptane(s)	500	400	skin, brain	high
petroleum naphtha	500		skin, *brain*, this mixture of aliphatic hydrocarbons may contain benzene.	high
Stoddard solvent	500	100	skin, *brain*, this mixture of aliphatic hydrocarbons may contain benzene.	high
gasoline			skin, *brain*, this mixture may contain benzene, lead, and ethylene dibromide, a carcinogen. Since mixtures vary, no TLV is set. Heart attack.	high
kerosene			skin, *brain*	high
jet fuel			skin, brain, peripheral nervous system	high
AROMATIC HYDROCARBONS				
benzene	10*	1	skin, brain, *liver*, *kidneys*, blood, causes cancer. May cause genetic damage	high
toluene	200*	100 s	skin, brain, irritation, heart attack	high
xylene	100		skin, brain, *blood*, irritation, causes menstrual problems, may increase the risk of heart attack.	high
coal-tar naphtha	100		skin, brain, *liver*, *kidneys*, *blood*, this mixture of aromatic hydrocarbons usually contains benzene.	moderate
nitrobenzene	1 s		skin, brain, liver, kidneys, blood	moderate
CHLORINATED HYDROCARBONS				
carbon tetrachloride	10*		skin, brain, liver, kidneys, causes cancer	none**
chloroform	50*	10	skin, brain, liver, kidneys, causes cancer	none**
methylene chloride	500*	200	skin, brain, blood, irritation, *lungs*	none**
tetrachloroethane	5 s	1	*skin*, brain, liver, kidneys, blood	none**
methyl chloroform (1, 1, 1 trichloroethane)	350		*skin*, *brain*, *liver*, heart attack	none**
ethylene dichloride	50*		skin, brain, liver, kidneys, irritation	high**
trichloroethylene	100		skin, brain, peripheral nervous system, *liver*, *kidneys*, causes cancer, heart attack	low**
perchloroethylene	100*		skin, brain, liver, *kidneys*, causes cancer	none**
KETONES				
acetone	1000		skin, brain, irritation	high**
methyl ethyl ketone	200		skin, brain, irritation	high
methyl butyl ketone	100	25	skin, brain, peripheral nervous system, irritation	high
methyl isobutyl ketone	100		skin, brain, irritation	high
ETHERS				
ethyl ether	400		skin, brain, *kidneys*, *irritation*	extreme
isopropyl ether	500	250	skin, brain, irritation	extreme
ESTERS				
ethyl formate	100		skin, brain, irritation	high
methyl acetate	200		skin, brain, irritation	high
ethyl acetate	400		skin, brain, irritation	high
isopropyl acetate	250	150	skin, brain, irritation	high
amyl acetate	100		skin, brain, liver, blood	high
GLYCOLS				
ethylene glycol			*skin*, brain, *kidneys*, *blood*, irritation	low
cellosolve	200 s	100 s	*skin*, brain, *kidneys*, blood, irritation, *lungs*	moderate
methyl cellosolve	25 s		*skin*, brain, liver, kidneys, blood, irritation, *lungs*	moderate
OTHER				
turpentine	100		skin, *brain*, kidneys, irritation	high
carbon disulfide	20*		skin, brain, peripheral nervous system, causes insanity and suicide, increases the risk of heart attack.	extreme
pyridine	5		skin, brain, liver, kidneys, blood, irritation	high
tetrahydrofuran	200		skin, brain, *liver*, *kidneys*	high
dioxane	100 s	1	skin, brain, liver, kidneys, irritation, *lungs*, causes cancer	high
nitromethane	100		skin, brain, irritation	high

† Proposals for new TLV's have been made by OSHA, NIOSH, or the ACGIH. NOTE: Italics indicate that the effect is weak, or only suspected.

* OSHA has additional regulations for these chemicals. See "air contaminants" in the General Industry standards.

s Known to be easily absorbed through the skin.

**Decomposes into phosgene by heat or ultraviolet light.

(from UAW Occupational Safety and Health Newsletter)

TECHNICAL REFERENCE MATERIAL

STANDARDS FOR GENERATORS OF HAZARDOUS WASTE

HAZARDOUS WASTE MANAGEMENT RULES

06-096 Department of Environmental Protection

Adopted pursuant to 38 M.R.S.A. Section 1301 et seq.,
the Maine Hazardous Waste, Septage & Solid Waste Management Act

March 1987

231

31-096

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Chapter 850

Identification of Hazardous Wastes

SUMMARY:

This rule identifies hazardous wastes. These hazardous wastes are subject to regulation according to the provisions of 38 M.R.S.A., Section 1301 et seq. and to this and other rules adopted thereunder. This rule is amended to include polychlorinated bipheny's (PCBs) as hazardous waste.

SAMPLE MANIFEST

ALL 8 COPIES MUST BE LEGIBLE! PLEASE TYPE.. SEE REVERSE SIDE FOR INSTRUCTIONS.

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Hazardous Waste MANIFEST SECTION, State House, Station 17, Augusta, ME 04333

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039 Expires 9-30-88

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. | Manifest Document No.

2. Page 1 of | Information in the shaded areas is not required by Federal law but may be required by State Law

3. Generator's Name and Mailing Address

4. Generator's Phone ( )

A. State Manifest Document Number: ME A 012194

B. State Generator's ID

5. Transporter 1 Company Name | 6. US EPA ID Number | C. State Transporter's ID | D. Transporter's Phone

7. Transporter 2 Company Name | 8. US EPA ID Number | E. State Transporter's ID | F. Transporter's Phone

9. Designated Facility Name and Site Address | 10. US EPA ID Number | G. State Facility's ID | H. Facility's Phone

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.					
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above

a. b.

c. d.

K. Handling Codes for Wastes Listed Above

a. b.

c. d.

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name | Signature | Month Day Year

17. Transporter 1 Acknowledgement of Receipt of Materials | Date

Printed/Typed Name | Signature | Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials | Date

Printed/Typed Name | Signature | Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.

Date

Month Day Year

GENERATOR

TRANSPORTER

DESIGNATED FACILITY

DESTINATION STATE COMPLETED COPY

ME A 012194

...evel, ...s spill, contact the National Response Center, U.S. Coast Guard 1-...424-8802.
...pill within Maine, contact DEP, Oil and Hazardous Materials Control at 1-800-452-0777.

HAZARDOUS WASTE TRANSPORTER LICENSES IN MAINE

Current as of 6/1987

B. Littlefield & Sons, P. O. Box 485, Lower Main St., North Berwick, Maine 03906 (Caroline R. Littlefield) (207-676-2255

Board of Pesticide Control, ME Dept. of Agriculture, Station #28, Augusta, ME 04333 (Robert I. Batteese, Jr.) (207-289-2731

C. M. Laboratories, P. O. Box 8002, 731 Broadway, Portland, ME 04101 (Gene McGurl) (207-772-3689)

Central Maine Power Company, Edison Drive, Augusta, ME 04330 (Any Towt) (207-623-3521)

Diamond Machine Co., P. O. Box 1608, River Road., Lewiston, ME 04240 (Gerald Tardiff) (207-784-1381)

Great Northern Paper Company, Engineering & Research Building, Katahdin Avenue, Millinocket, ME 04462 (Ronald C. Howes) (207-723-5131)

Houlton Water Co., P. O. Box 729, 21 Bangor Street, Houlton, ME 04730 (Steve Sacoby) (207-532-2259)

Jet Line Services, Inc., 441R Canton Street, Stoughton, MA 02072 (Al Marzelli) (617-843-2829) and 106 Main St., South Portland, ME 04106 (Jim Guzelian) (207-799-0850 or 800-jet-line) (WOT #000009)

Maine Dept. of Transportation, Box 1208, Hogan Road, Bangor, ME 04401 (John Rand) (207-942-4868)

Merrill Transport Company, Box 739, 1037 Forest Avenue, Portland, ME 04104 (James E. Mountain) (207-797-7611) (WOT #22)

P & D Waste Transfer, P. O. Box R, Old Orchard Beach, ME 04064 (Dale Blow) (207-934-4687 or 2525)

Portland Oil Recycling, RR #1, Box 1320, Kennebunkport, ME 04046-9558 (George R. West III) (207-985-3975) (WOT #11)

Safety-Kleen Corp., 655 Big Timber Road, Elgin, IL 60120 (312-697-8460) and Route #202, Leeds, ME 04263 (Jeff Pellitier) (207-933-4496)

Seacoast Ocean Services, 37 Custom House Wharf, P. O. Box 2316, South Portland, ME 04106 000026 (David P. Look) (207-774-2111) (WOT #000008)

Security Heel0Maine, 1 Saratogo St., P. O. Box 1811, Lewiston, ME 04240 (J. Robert Krauss) (207-783-2081)

SELF EVALUATION CHECKLIST

In making your checklist be sure to include these major areas:

Walking and Working Surfaces

Stairs

Storage Lofts

Ladders

Health and Environment Control

Noise Exposure

Hazardous Materials & Disposal Procedures

Spray Painting

Personal Protective Equipment

General Environment Controls

First-Aid

Fire Protection

Compressed Air

Materials Handling and Storage

Machinery and Machine Guardings

Hand Tools

Portable Powered Tools

Welding, Cutting, and Brazing

National Electrical Code

Record Keeping.

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New Hampshire State Department of Education, Division of Vocational Technical Education, Recommended Safety Standards For Related Programs in Vocational, Technical, Industrial Arts, and Prevocational Education, Concord, New Hampshire: State Department of Education, 1977.

New Jersey Administrative Code Education, Vocational Education Safety Standards, Trenton, New Jersey: Department of Education, 1977.

Oklahoma State Board of Vocational Education, Accident Prevention for Industrial aRts, Vocational and Technical Programs, Stillwater, Oklahoma: Oklahoma Curriculum and Instructional Materials Center.

The University of the State of New York, Industrial ARts Safety: A Management Plan, New York, New York: Bureau of Industrial Arts, 1977.

19.00

ADDRESSES AND PHONE NUMBERS

American National Standards Association (ANSI)
1430 Broadway
New York, NY 10018

American Vocational Association
1510 H. Street, N.W.
Washington, D.C. 20005

Health and Safety Consultants
(For a list write to:)
American Industrial Hygiene Association
475 Wolf Ledges
Akron, Ohio 44311

National Fire Protection Association (NFPA)
470 Atlantic Avenue
Boston, Massachusetts 02210

NIOSH Regional Office, Region 1
Government Center (JFK Federal Building)
Boston, Massachusetts 02203

OSHA Regional Office, Region 1
U. S. Department of Labor
JFK Building, Room 1804
Boston, Massachusetts 02203

OSHA Area Office
Room 121, Federal Building
Western Avenue
Augusta, Maine 04330

Division of Safety
Bureau of Labor Standards
State House Station #82
Augusta, Maine 04333

Department of Environmental Protection
Bureau of Oil and Hazardous Materials Control
State House Station #17
Augusta, Maine 04333

20.00

FOR EMERGENCY INFORMATION, CALL:

Maine Medical Center

Portland, Maine (24-Hour Service)

Toll Free 1-800-442-6305

Chemtrec - National Response Center For Chemical Emergencies

Washington, D. C. (24-Hour Service)

Toll Free 1-800-424-9300

21.00

SAMPLE MANIFEST

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Hazardous Waste MANIFEST SECTION, State House, Station 17, Augusta, ME 04333

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Form Approved. OMB No. 2050-0039 Expires 9-30-88

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E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address | 10. US EPA ID Number

G. State Facility's ID

H. Facility's Phone

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a.					
b.					
c.					
d.					

J. Additional Descriptions for Materials Listed Above

a. b.

c. d.

K. Handling Codes for Wastes Listed Above

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Printed/Typed Name | Signature | Month Day Year

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FACILITY

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Date

Printed/Typed Name | Signature | Month Day Year

DESTINATION STATE COMPLETED COPY

ME A 01271

...e event of a spill, contact the National Response Center, U.S. Coast Guard 1-(...)424-8802. ...pill within Maine, contact DEP, Oil and Hazardous Materials Control at 1-800-482-0777.

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19.00